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ELECTRICAL CONTRACTING

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DECEMBER
1935

IN TWO PARTS—PART I

Industrial Patchwork

Ganged Outdoor Conduits

Low Cost Farm Wiring

Lower Connection Costs

Outdoor Christmas Lighting

Speedy Bearing Service

Employee Sales Factor

Shop Cleanliness

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for

ELECTRICAL CONTRACTORS
INDUSTRIAL
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ELECTRICAL INSPECTORS
ENGINEERS
SERVICE SHOPS

and others engaged in the business of electrical construction

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United States Rubber Company

DECEMBER 1935

Information

THIS issue is in two parts, because ELECTRICAL CONTRACTING is offering in Part 2 another timely service to the electrical trade—a Buyers Reference Edition. It is intended to make this an annual feature of our service.

NOW that the tide of business is once more coming in, buyers will be looking for the old names with which they used to do business B. D. (before the depression), and while a great many will be among the living, others will be among the missing. Not only have many changes occurred among manufacturers, but in the search for business new uses have been found, new products developed and old ones abandoned. These changes, however, must not be allowed to handicap a buyer. His orders are far too precious after six lean years. And that is the reason for this Buyers Reference Edition.

IN PRESENTING it, the publishers of ELECTRICAL CONTRACTING offer no apologies. Money and man power were not spared to make this edition as fine as possible. Naturally, when the products of 3,430 manufacturers are analyzed and listed, there will be some manufacturers who neglect to give complete and accurate information. However, as the value of the directory becomes more apparent to them, we feel that fuller cooperation will result with succeeding editions.

NO ATTEMPT has been made to list the unusual specialty or special equipment not distributed, as a rule, through the electrical trade. Much of that information, however, is available and will be gladly furnished by our directory department upon request.

IN FACT, ELECTRICAL CONTRACTING is glad to have the trade consider it a source of information on such or any other questions. The editors of ELECTRICAL CONTRACTING answer hundreds of letters for subscribers every year. They are glad to render that service, and urge their subscribers to let them be of help whenever they can.

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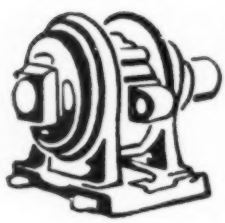
notes:-

for wide awake contractors

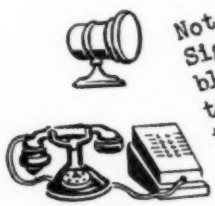
Important selling opportunities are opening up every day -- for alert contractors. By showing that electrical efficiency is the road to profits, alert contractors are turning small orders into big jobs. Here are some pointers:

Note:--Obsolete wiring hinders efficiency, both in industry and commerce. New wiring layout can mean more efficiency -- profits. Sell the idea. Prove the point with dependable supplies from Graybar.

Note:--Better lighting increases production per man in office and factory. A good basis to sell lighting. Turn to Graybar for all kinds of up-to-date fixtures and glassware.



Note:--Check up on motors, too. Graybar can back you up with prompt service on full line of standard motors and control.



Note:--Interphones. Signals. All profitable items for the Contractor. Sell them as time and energy savers.

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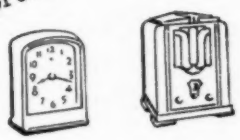

ELECTRICAL CONTRACTING

Vol. 35 DECEMBER, 1935 No. 2

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S. B. Williams, Editor

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FIELD BRIEFS

● LATEST STATISTICS now show the monthly power output to be greater than that generated in the same months in 1929.

● SINCE EARLY SUMMER the number of reports of new electrical contractors opening stores has been increasing. For two years or so prior to that, such reports were few and far between.

● THE FIRST of the farm electrification cooperatives under REA financing are taking bids as this goes to press—193 miles in Miami County, Ohio, and 270 miles in Shelby County, Ohio. The cost of the former is placed at $180,000, and the latter at $250,000.

● FUNDS WILL BE COLLECTED next spring to provide a memorial to Thomas A. Edison. The program, which will be under the chairmanship of Owen D. Young, contemplates an educational program for the encouragement of youth in the pursuit of scientific knowledge and also creating facilities for the preservation of Edison's personal library, his records and papers and originals or replicas of each of the more than one thousand inventions which he developed.

● APPROXIMATELY 75 per cent of bootleg wiring in New York City, it is estimated, has been stopped by the new practice of giving municipal electrical inspectors police power. Each inspector has a book of tickets. Whenever he catches anyone bootlegging, he gives that person a summons to appear in court.

● OF NINETEEN Red Seal homes that were wired at Kansas City, Mo., in October, seventeen homes of the smaller type averaged better than sixty-eight outlets each. By including two larger homes, the total average becomes seventy-five outlets per home. Thirteen homes are reported to be in the low-priced class. This report also represents the best Red Seal month since April 1932.

● DURING THE EIGHT YEAR period of 1927-1934 electrical inspection made an average profit for the city of Denver of $3,800 a year. Because this profit goes to help operate other building department activities, the Electrical League of Colorado has petitioned the city to hire an additional electrical inspector and use whatever profit remains entirely in the electrical department. Among other things it is suggested that any surplus be used to educate the public.

● THE FIRST OF A SERIES of housing shows under FHA sponsorship, will open in Baltimore, January 4. In each show a complete home furnished by local enterprise will be the central feature.

● IT SOUNDS like the good old days are coming back to hear such pioneers as L. W. Kiesewetter speak of planning to keep all his good men together to avoid an anticipated shortage of skilled mechanics.

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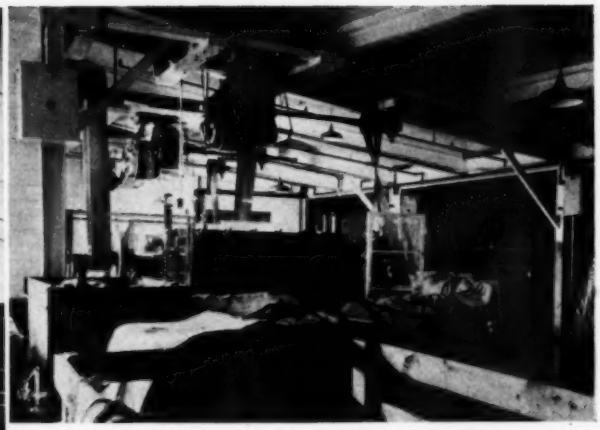
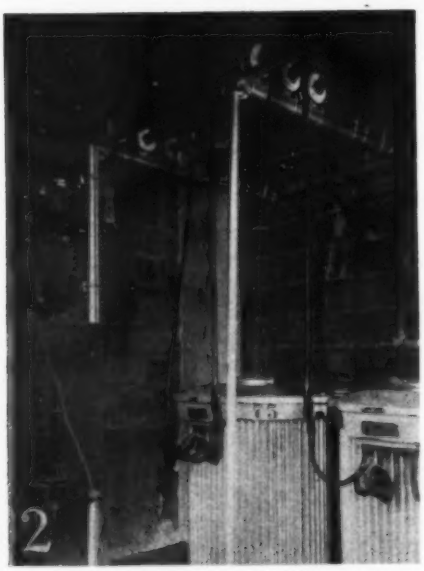


Mopping Up Industrial Patchwork



1. In contrast to the unsightly open service spans which serve a neighboring plant at the left, a new underground 3/0 service was provided with 3-in. conduit extending across the alley and up the pole. A spare conduit was also installed alongside to permit pulling in a new feeder should a cable breakdown occur.

2. A new two-story transformer room and switchhouse annex was provided, thus isolating the main service equipment from the working areas of the factory.

3. The main power and lighting distribution equipment and the primary meters were placed in a new fireproof room above the transformers. Only a short run of 6-in. conduit was needed for feeding the 800-amp. main power switch from the transformers.

4. The strike-out department now has three individual 15-h.p. inverted drives with automatic tension bases. Magnetic starters have been provided, their motor control buttons being suspended before each machine operator, replacing obsolete drives and controllers.

THE smaller industrials, because of having usually experienced a gradual expansion, offer definite opportunities for electrical improvements in revamping their electrical system to coordinate the patchwork wiring that has grown from previous plant additions. Such an operation is now nearing completion in the plant of Walter L. Johnson, Inc., Endicott, N. Y., makers of leather specialties for the shoe and belting industries.

When a new section was recently added to this plant, the lid was off because of the obvious advantages that had accrued through the introduction in this wing of better light, safe machine controls, efficient drives, freedom from maintenance, and the elimination of interrupted production. A program of plant-wide system coordination was authorized, which incorporated the elimination of unsafe or faulty electrical equipment, the replacement of old feeders and distribution centers with more adequate capacities; the breaking up of group drives into individual units; the relocation of controls in keeping with the modern facilities made possible by the use of magnetic starters; and the isola-

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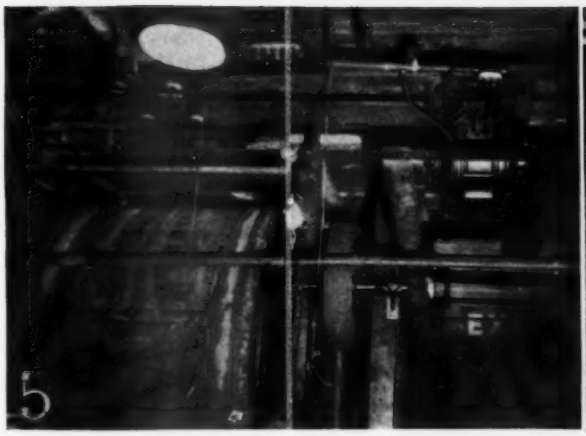

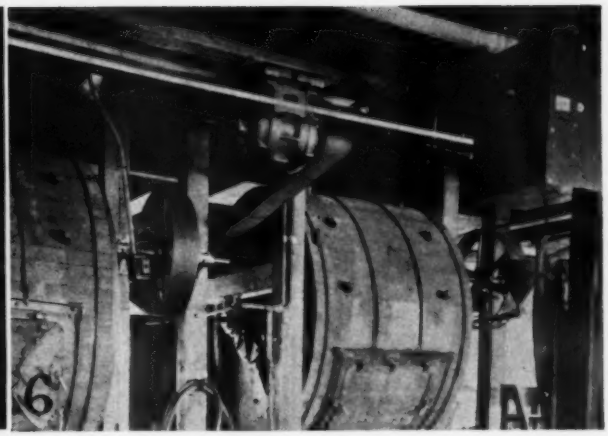

tion of main control equipment from the general plant areas.

Looking forward to years of operation, a new fireproof building was added to house a new transformer station, from which a new primary service was run underground to the power company's pole line. This building was planned to also house the modernized main distribution equipment for both light and power systems. This made possible the gradual changeovers from the existing systems without serious interruption to daily production.

This work was done by the Peoples Electric Company of Endicott, N. Y.

5. An obsolete controller for 15-h.p. motors driving drum wash wheels. Rope-operated levers controlled the multiple mercury contact mechanism which appears on the ceiling.

6. A modernized drum wash wheel drive with its magnetic control made accessible for maintenance, and the push button placed by the operator.

Installing Ganged Conduits for Station Platforms

THE installation of concealed feeder and signal conduits in the New York Central's new station and elevated track system at Syracuse, N. Y., required installation methods that would provide for free expansion in long runs at various cable manholes and splice boxes, and that would also withstand corrosion in railroad service. This system is being installed by the Edward Joy Company, local electrical contractor, in cooperation with the railroad engineering staff. It provides for economical design in the massing and routing of large conduits between a series of long concrete platforms and a central control room. The entry to many manholes and splice boxes with ganged runs of conduit required precise alignment that would allow freedom of movement during seasonal expansion of the structure or of iron conduit runs between platforms. Because of this condition it was also necessary to consider the prevention of corrosion from seepage.

Approximately 38,000 ft. of 3-in. fiber conduit, 14,000

1. Part of one of the platforms in the course of preparation for pouring concrete. A 6-gang run of 3-in. fiber conduit has been distributed on the form in readiness for the installation crew.

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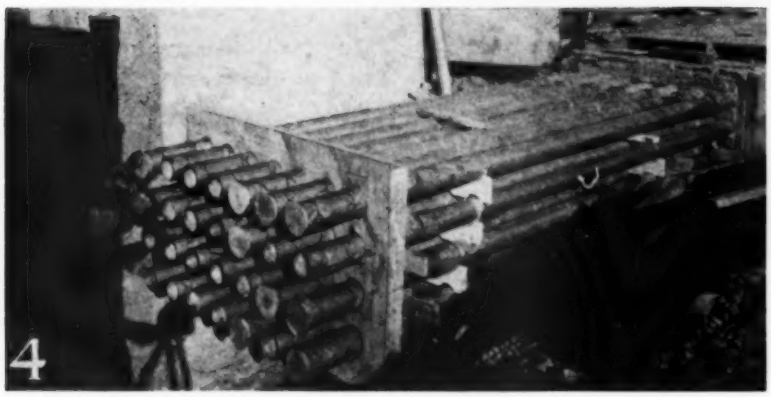
ft. of 3-in. rigid iron conduit, 2,400 ft. of 3-in. and 1,000 ft. of 2-in. wrought iron conduit will be installed within and to interconnect the platforms. Another 32,500 ft. of 3-in. fiber conduit is being installed along the embankment platform for the signal system. Additional quantities of smaller conduits for power, lighting and miscellaneous wiring are being used for the station building, the run-ways, and under the platform roofs.

2. An underslung 10-in. deep concrete trough was provided in the platforms to receive the lengthwise ganged runs of fiber conduit between manholes. Loose sand was packed in around these runs after which the platform slab was poured, forming a rectagular concrete cell for the fiber conduits. This method was chosen in preference to concealment in the concrete slab or the routing of rigid iron conduits in underground trenches. Because these cells will remain reasonably dry, it was possible to use rubber covered cable instead of lead sheathed. A further economy was realized in the lower cost which resulted by using fiber conduit in level runs. The use of looped rigid conduit runs from the ground level up to various manholes would also have required more cable.

3. An expansion joint in a 24-conduit bank occurring at a structural expansion joint. Opposite lengths of fiber conduit were kept 3 in. apart and wrapped with 20-ga. galvanized sheet steel. A 2-ft. sleeve of 4-in. rigid iron conduit was telescoped over this assembly. Waxed paper was wrapped over the ends of the 4-in. sleeve to exclude concrete, and thus leave the fiber conduit free to move in and out of the telescoping sleeve during the anticipated expansion and contraction of the structure.

4. The large number of 3-in. conduits which converged at the control center necessitated their being grouped in slanting assemblies as they were brought over from the various track platform manholes. This bank of twenty-eight 3-in. rigid iron conduits is already concreted in at the extreme right. At the left foreground is a template which will be a part of the form for a 10-in. concrete wall forming the cable vault which leads to the control room. The ends of these conduits are wrought iron hot dipped galvanized nipples, selected for greater resistance to corrosion from seepage at the expansion joint which exists between the cable vault wall and the conduit encasing concrete. Each conduit will be plugged with a wooden beveled-face "bung" that sits flat against the inner form surface. When the form is pulled and these "bungs" are removed, there will be a concave or funneled concrete "mouth" leading to the end of each conduit that terminates in this 10-in. cable vault wall. Wax paper is wrapped around each nipple to assure free conduit movement in future expansion and contraction.

5. A close-up of eighteen 3-in. hot dipped galvanized wrought iron conduit nipples stubbed out from a platform manhole. Exact spacings were maintained throughout this job by making templates of heavy "Masonite" boards, like the one which appears flush in this 10-in. thick manhole wall. These single sheets of material were laid out and bored accurately for the desired number and layers of holes. There was no problem of warping, or sagging as might occur in a similar panel of stock lumber form. Likewise this layout could be made away from the site, whereas the boring of a built-up wooden form might result in mis-alignment of holes. The waxed paper wrappings are also in place on the nipples.



Some Experiments in

Lower Cost Farm Wiring*

1. **Service Entrance Capacity Formula**
2. **Pole Metering**
3. **Non-Metallic Sheathed Cable**
4. **Bare Neutral**
5. **Unfused Main Switch**

by Morris H. Lloyd,
Rural Service Engineer, Buffalo, Niagara and Eastern Power Corp.

▼

The effort among power companies to stimulate demand for rural electrical service is accompanied by continued investigations into ways and means for lowering the cost of farm wiring. The following article discusses types of materials, and installation principles that are being fostered to bring this about. Because this activity will affect the farm wiring contractor in his selection of materials and in the laying out of rural installations, *Electrical Contracting* has abstracted this paper.

THE companies of the Niagara-Hudson System have been attacking the problem of lower cost wiring materials for some time and have initiated several trial projects, portions of which have since been adopted by the National Electrical Code as approved practices. These trial projects included the use of service entrance cable, including unarmored types with uninsulated neutral conductor, bare ground wire, simplified grounding with a common ground wire and single driven rod or pipe, simplified service entrance switch with the meter ahead of the fuses, and the use of non-metallic sheathed cable in all farm buildings. A service entrance capacity formula has also been put in use through a trial project which is still in effect, as well as the use of non-metallic sheathed cable with an uninsulated neutral wire for interior wiring, together with a suitable line of boxless, nonmetallic fittings; also the use of an unfused main switch. In addition, pole metering is used on those farms where it will reduce wiring costs.

1. Service Entrance Capacity Formula

The service entrance capacity formula is a method by which the size of entrance wires and switch or circuit breaker is determined by formula instead of the total connected load. Its use is limited to residences and farms.

The formula is as follows:

"For all lighting and all appliances each less than 1,650 watts: ½ amp. per outlet (at 115 volts) but not less than 5 amp. (at 115 volts) for any branch circuit.

"For appliances of 1,650 watts, or larger, 1—80%; 2—75%; 3—65%; 4—50% of full name plate rating.

"Switch outlets will not be counted. Each duplex convenience outlet will be counted as one outlet.

"Under the terms of this proposal, no service will be installed with line conductors smaller than 3 No. 6. No service breaker smaller than 50 amp. will be used."

This formula will be found especially useful in case a water heater, or other heavy duty appliance, is to be added in a residence where a range service is already installed, or where the range is to be replaced with one of higher wattage rating. In such cases it will seldom be necessary to replace the service. The formula also has application for farm loads where incubators, dairy utensil sterilizers, and other high-wattage equipment may be used.

Let us assume a farm with house and barn to be wired for the following loads:

House:	Range	8,500 watts
	Water Heater	2,000 watts
	Lighting	2,000 watts
Barn:	Dairy Scalder	2,000 watts
	Lighting	1,500 watts
Total	.....	16,000 watts

The barn is located 300 ft. to the rear of the house, service and meter are in the house. Applying the formula, we find three appliances each over 1,650 watts, totaling 12,500 watts.

Multiplying by the factor of 65 per cent gives 8,125 watts to be wired for in the service—equivalent to 35 amp. at 230 volts. Assuming that the 3,500 watts of lighting in the house and barn are wired on five circuits, we require 5 amp. (the minimum per circuit) times 5 circuits, or 25 amp. in the service at 115 volts, or 12.5 amp. at 230 volts. The total capacity to be wired for then becomes 35 amp. plus 12.5 amp. or 47.5 amp., for which three No. 6 conductors and a 60-amp. switch are sufficient.

The formula can be used also for figuring service exits and entrances beyond the meter, feeding the various outbuildings of the farm. Where any amount of heating load is in use which has a reasonable diversity factor a saving in wiring costs is thereby effected.

*Abstract of address before a meeting of North Atlantic Section, American Society of Agricultural Engineers, Ithaca, N. Y., Oct. 9, 1935.

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2. Pole Metering

The presence of any combination of the following three conditions may indicate the desirability of this form of meter installation:

1. Buildings over a scattered area are wired.
2. Appreciable load is installed or contemplated in each of two or more buildings.
3. House and barns are on opposite sides of the road along which the company's distribution line extends.

The company furnishes the customer's contractor a suitable weatherproof meter and test block cabinet. From the cabinet the contractor installs a 1½-in. rigid conduit up the pole terminating in a 4-wire weatherhead. Four No. 2 rubber-covered conductors extend from the meter box to the pole top, two for line wires and two for load. The neutral is cut through solid at the pole top, and the equipment only is grounded at the pole.

For an example, let us turn to the installation used above, where the total load of 16,000 watts can be carried on three No. 6 wires and a 60-amp. main switch. We can determine the size of conductors to the barn in several ways. If figured in accordance with the National Electrical Code, the total load of 3,500 watts requiring 15 amp. at 230 volts could be carried on three No. 14 conductors. However, this would give a 25-volt drop and hence be impractical. Furthermore it is outside construction and good practice would require a minimum of three No. 8 conductors for mechanical strength. Even this size gives a drop of 6 volts which also would be unsatisfactory.

If we allow for a loss of 1 per cent, a distance of 300 ft. and a load of 15 amp., we find that three No. 4 conductors are required. Two No. 4 "hot" wires will satisfy voltage drop requirements, and Code requirements will be satisfied with No. 8 neutral and in the exit from house and entrance to barn.

If later a 7½ hp., single-phase motor is added to the barn equipment, the circuit would have to have current carrying capacity of 125 per cent of the full load current of 34 amp., or 42.5 amp. For the initial installation in the barn we have a load as follows:

Scalder—	
2,000 watts.....	8.7 amp. at 230 v.
Lighting—1,500 watts, 2 circuits of 5 amp. at 115 v.	5.0 amp. at 230 v.
Total	13.7 amp. at 230 v.

This load could be handled with three No. 14 conductors as far as safe carrying capacity is concerned. Mechanical strength would be satisfied with No. 8 wire. But 1 per cent voltage drop at a distance from the meter pole to barn of 250 ft., requires No. 4 wires. Thus two No. 4 and one No. 8 neutral could be installed.

With the addition of the 7½-hp. motor, the pole meter switch would need to be increased to 100 amp. and the house service would be left undisturbed. At the barn, however, where we would have a new load of 13.7 amp. plus 42.5 amp. or 56.2 amp., the three No. 8 wires and 30-amp. switch on the entrance must be changed to three No. 4 wires and a 100-amp. switch.

For the span from meter pole to barn weather head the code requirement would be three No. 4 wires but the 1 per cent voltage drop requirement necessitates two hot wires of No. 2/0 size. As No. 2/0 is exceptionally large, some saving in copper could be effected by using two No. 1 wires and a No. 4 neutral, giving a drop in voltage of 1.35 per cent which would probably be satisfactory.

For the total load, including motor, under the three different conditions of meter location, we have:

Meter in House

Main Service Entrance 3 No. 2 wires
Main Service Switch 100 amp.
Exit from House 3 No. 4 wires
Overhead to Barn 2 No. 3/0, 1 No. 4
Entrance to Barn 3 No. 4 wires
Barn Service Switch 100 amp.

Meter in Barn

Main Service Entrance 3 No. 2 wires
Main Service Switch 100 amp.
Exit from Barn 3 No. 6 wires
Overhead to House 2 No. 1, 1 No. 6
Entrance to House 3 No. 6 wires
House Service Switch 60 amp.

Meter on Pole

House Service Entrance 3 No. 6 wires
House Service Switch 60 amp.
Overhead from Pole to House 3 No. 6 wires
Barn Service Entrance 3 No. 4 wires
Barn Service Switch 100 amp.
Overhead from Pole to Barn 2 No. 1, 1 No. 4 wire

3. Non-metallic Sheathed Cable

Experience has shown that non-metallic sheathed cable provides a more durable and a safer wiring method in dairy barns, poultry houses, and other farm locations than does conduit or lead-covered armored cable as it cannot rust nor corrode. In addition, the sheath is non-conducting, hence no possibility exists of voltages fatal to cattle being built up. Its use reduces wiring costs considerably.

We have been informed by the inspection department of the Hydro-Electric Power Commission of Ontario, that it will no longer approve new farm wiring installations not installed in non-metallic sheathed cable. It has found favor in several states where the type of soil makes it difficult to establish good, low resistance grounds.

4. Non-metallic Sheathed Cable with Bare Neutral

The 1935 Code, Section 517, will approve a bare neutral in the range circuit, if service entrance cable is used. If an uninsulated or bare neutral is approved for a range circuit, it would seem logical that it would be equally safe and satisfactory for other purposes. Accordingly, a number of the wire and cable manufacturers have made plans for the production of such cable in a full line of sizes from two-wire No. 14 up. Application has been made for permission to make trial installations on 5,000 New York farms and also for permission to use a line of suitable non-metallic fittings. While these are not yet on the market, two manufacturers have started to develop them.

5. Unfused Main Switch

As previously mentioned, application has been made for a trial project on an unfused main switch. The reasons for this are:

1. The lighting branch circuits are fused, as is also the range circuit and any other circuits.
2. If main is also fused, and range and some other circuits are fairly well loaded, it is an even chance as to whether range or main fuse will blow when an overload occurs on the range circuit.
3. Some possibility exists of saving in cost of the switch.

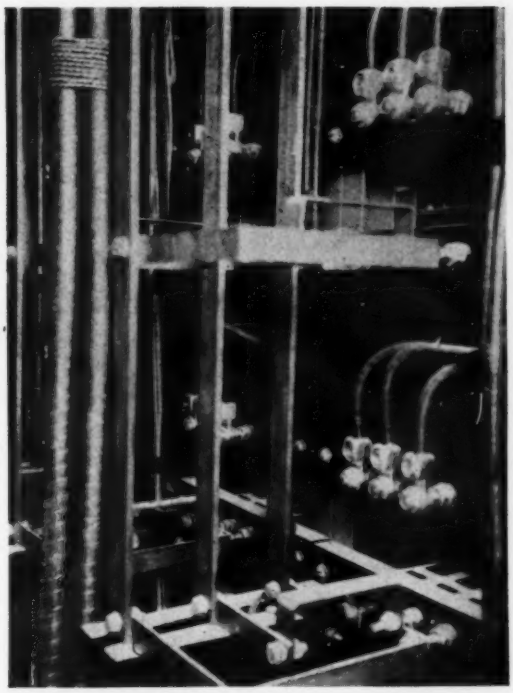
1. Nine solderless terminals were used for 1,500,000 c.m. lead sheathed main lighting feeders that are run in 6-in. conduits to the main switchboard.

Halving Feeder Connection Costs

EVERY feeder cable connection in the new Proctor High School at Utica, N. Y., is being made with solderless terminals at a labor cost of approximately 50 per cent of conventional soldering and sweating methods.

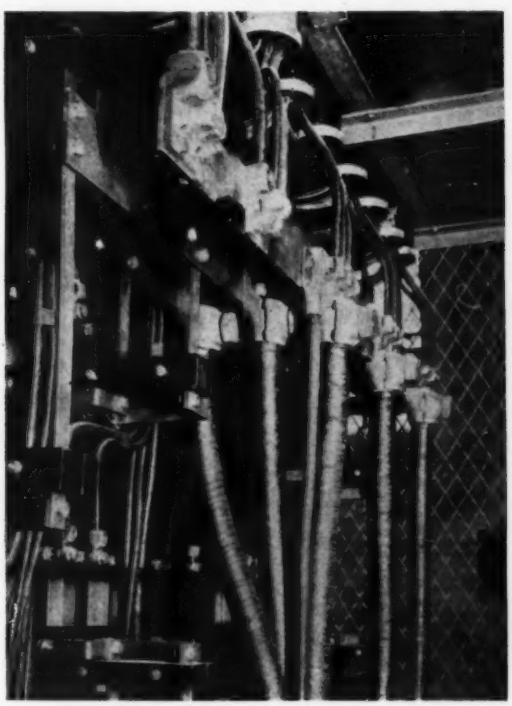
This installation by the Langdon and Hughes Construction Company of Utica begins with nine 1,500,000 c.m. lead sheathed main lighting feeder terminals at the transformer leads. From this point to the various lighting and power load centers the terminals are equipped with solderless connections.

2. A set of three 1,500,000 c.m. solderless cable terminals at close range. The many strands comprising these conductors are clamped by terrific core compression, and therefore did not require tinning after the vulcanized insulation had been cleaned off.



3. The main switchboard connecting operation required less flexing of cables than to bring them to suitable tinning and lug soldering positions. As soon as they were cleaned of adhering rubber, the pressure was applied and the job was done.

4. The smaller sizes of feeder control units of this compact circuit breaker switchboard result in a density of rear cable connections. Angular socket wrenches simplified this operation, and left a neat alignment of conductors.



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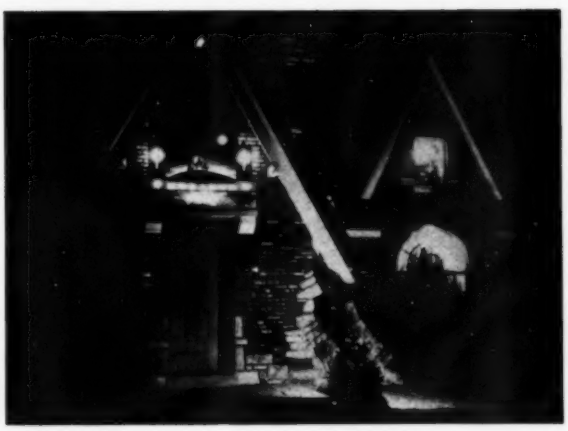
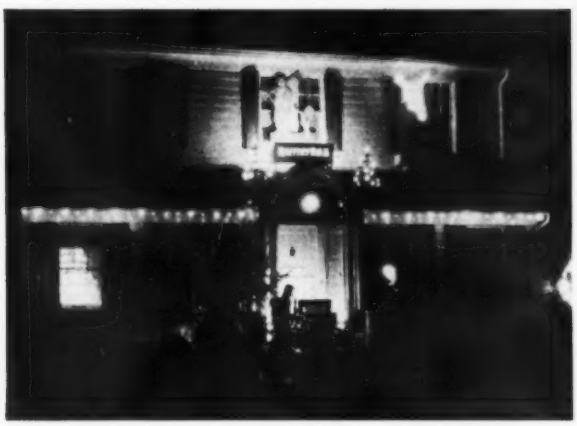
Floods and Cutouts for Christmas Lighting





The use of floodlights and Nativity cutouts is gaining for outdoor Christmas lighting. The three illustrations on this page show some inexpensive yet effective ways in which the two can be combined.

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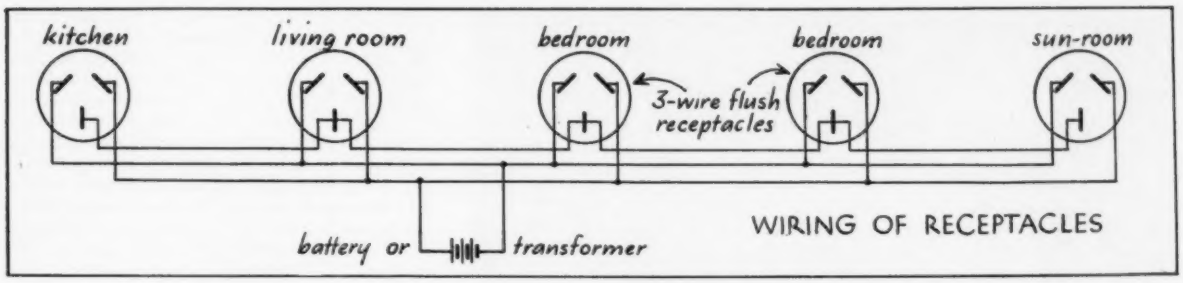


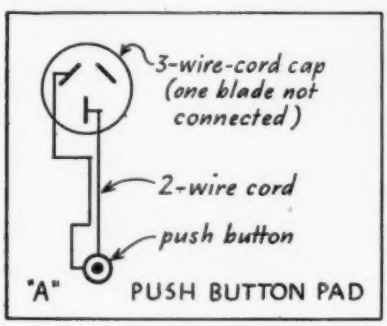
1. A Flexible Buzzer System

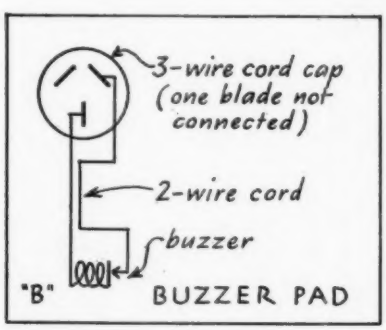
A GUEST or an invalid in a home sometimes causes a problem in easy communication, for it may be desirable to be able to signal from one room to any other. This may be accomplished by installing a 3-wire polarized receptacle at convenient points in various rooms and connecting them all in parallel, as shown by the wiring diagram.

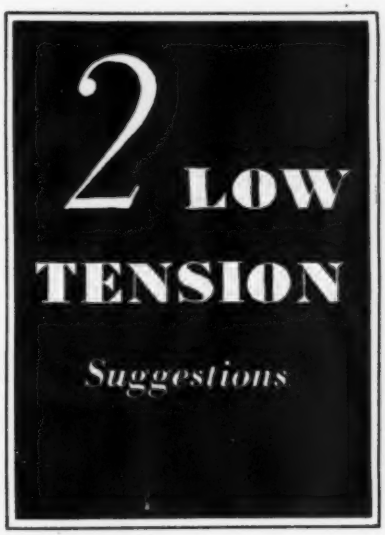
A buzzer and its companion push-button may be plugged in at any pair of receptacles—as, for instance, in the kitchen and bedroom in the morning, the living room and bedroom in the afternoon, and bedroom to bedroom at night—thereby establishing ready communication between the two points.

A standard push-button pad is connected to a 3-wire cord cap, as shown by "A," and a buzzer (preferably mounted on a wooden pad) is connected to another 3-wire cap, as shown by "B." Wiring, of course, follows standard low-tension practice, and the source of power may be either a battery or a bell transformer.

To make plugging-in as easy as possible, the receptacles should be located about 3 ft. 6 in. above floor level, and the pad cords should be 5 or 6 ft. long.







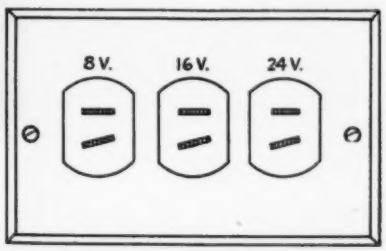
If a return-call system is required, the same general scheme is followed, using 4-wire receptacles and running four wires between receptacles. Two pads are made up, each with its buzzer and push-button, and a 3-wire cord is connected to three blades of a 4-wire cord cap.

2. An Electrical Toy Outlet

THE weeks just before and after Christmas offer contractors an opportunity to sell their customers the idea of a low-voltage outlet in children's play-rooms. Electrically operated toys are popular gifts, but parents invariably fear that some accident may happen on the high voltage side of the toy transformer. This fear can be quieted, and the convenient use of toys furthered by suggesting a permanent source of current for playthings.

Three "interchangeable" type radio receptacles can be installed under one single-gang plate, with each receptacle wired to give a fixed low voltage which is identified by engraved numbers on the brass plate. This combination is fed from the 3-tap secondary of any standard 50-watt transformer, which, of course, may also be used for bell-ringing service. In many cases, a transformer of this type will be found already installed in the home.

The radio type receptacle is recommended because it is designed for use only with a special cap having one twisted blade. When this cap is attached to the cord of low-voltage toys, they cannot be connected to the regular lighting circuit receptacle by mistake.



This installation is inexpensive and easily made; the engraved plate complete with three receptacles costs less than $2.00; the cord caps cost less than nine cents each; and the wiring follows standard low-tension procedure.

If only one voltage is wanted a single radio receptacle and a single-opening plate may be used, with some saving in both material and installation costs.

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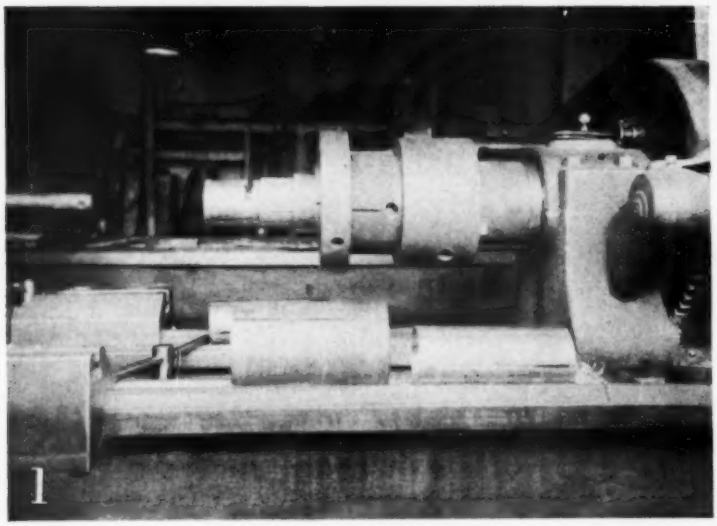


1. A $100 investment in expert machine work and materials provided a universal sleeve bearing chuck with which it is possible to do precision work in one-half the time that is usually required. This attachment fits the spindle of an 18-in. lathe. A machined compression collar is run by hand upon the tapered chuck threads to provide a tight automatically centered grip on the bearing shell. Uniform tension is obtained around the shell's circumference without danger of crushing it as sometimes occurs in conventional chucking methods. Sleeves from 1⅞ in. to 4¼ in. outside diameter, and up to 7 in. long can be accommodated. Twelve graduated size bushings were made up to telescope within the master chuck compression sleeve, these being of high grade steel, with lengthwise flexing slots cut in from both ends. These sleeves vary in thickness from ⅛ in. to ½ in., and some are bored to provide two different internal diameters at opposite ends. Two or more sleeves are combined as reducer bushings for chucking the smaller diameter bearing shells. The main unit of this chuck was machined down to 7 in. diameter from a large motor shaft coupling, and its compression sleeve half employs twelve threads per inch, tapered ¼ in. per 4-in. length.

2. Before systematizing the bearing department, a complete re-babbiting and precision machining averaged 8 hours per set of bearings, as against a present average of 3 hours. With the universal chuck, the machine operation becomes greatly simplified. About 65 per cent of new bearings require some machining to fit them to worn shafts, while re-babbitted shells must be trimmed down about ⅛ in. to a finished bearing wall thickness of from 1/32 to 1/16 in. for smaller motors, and up to ½ in. for larger motors.

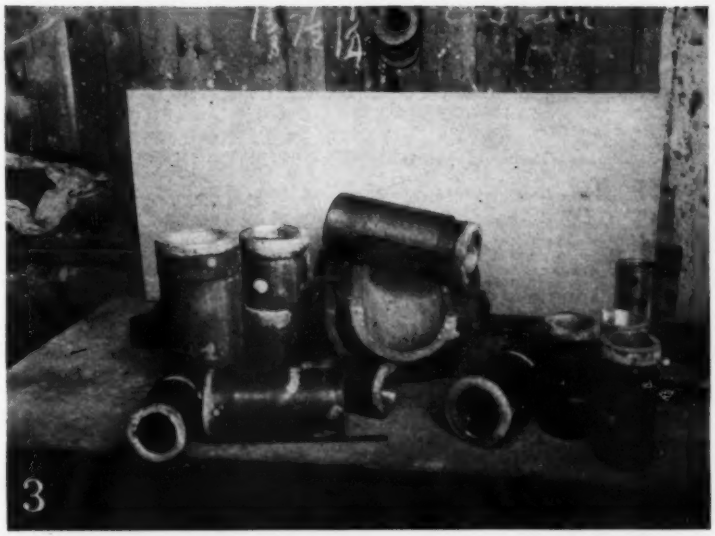
Efficient production methods and stock check-up bring

Speedy Bearing Service

WITH about 75 per cent of old motors above 5 hp. employing babbitted sleeve bearings, their replacement has become an important item in rendering speedy and efficient motor repair service, so much so in fact that a bearing department has been set up in the shop of the Sterns Electric Equipment Company of Buffalo, N. Y.

Its facilities have been worked out to make this company first of all independent of outside purchases of babbitted bearings with the probable risk of unforeseen procurement delays thus greatly eliminated. Next, a systematic accumulation of stock bearing replacements is followed, so that a reasonably wide range of sizes has been acquired. This makes for speedy bearing service on hurry-up

3. Assorted sizes of bearings are kept in stock, some in the rough poured state, while others are machined to standard shaft diameters. A slotted chuck-bushing is shown as it is applied to a rough sleeve for its insertion into the universal bearing chuck. Lots of 30 to 60 shells are babbitted at one operation.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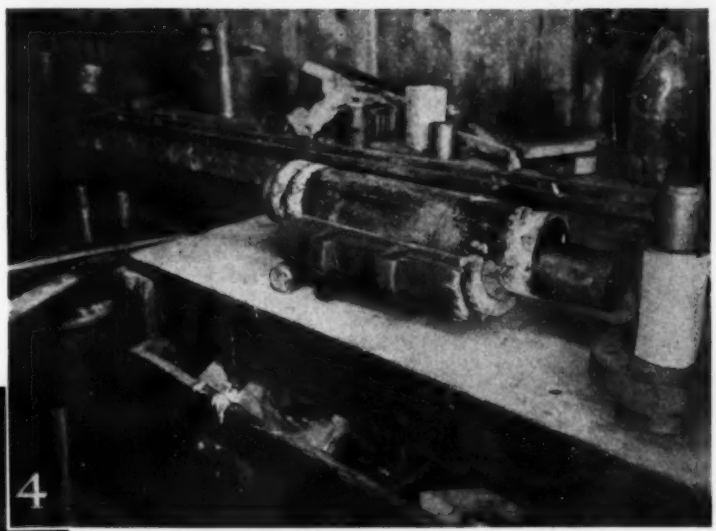
4. The layout bench for babbitting is near the melting furnace, the bearing lathe and the stock-shelf. Twenty sizes of mandrels are available to form the internal core in pouring babbitt. Careful selection of these mandrels assures the correct wall thicknesses to avoid unnecessary turning down of excess material, yet sufficient to permit the removal of any imperfections, allowing usually a ⅛-in. cut. For the larger shaft sizes, such as split bearings, the use of pipe mandrels is more common, allowing a ¼-in. excess for waste or trim. Short pieces of shafting are laid within these sleeves to weight them down during the end-sealing and mandrel aligning process. Paper wrappings around the bearing shells cut down the spillage that usually adheres to and must be removed from the outer surfaces of the shells.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5. The correct pouring temperatures for various grades of babbitt metal range from 700 to 1,000 deg. F., which requires a furnace outfit of high and intense heat control. This outfit has an adjustable air-blast gas jet which is trained upon the melting pot until the immersion thermometer registers a suitable condition. The thermometer is suspended from the overhead steel canopy, in which is provided an exhaust fan for the removal of gases. Scrap sleeves are melted out here, as well as the trim from rough stock, this salvaged metal being analyzed before it is re-used.

5

emergency calls. Finally, the development of efficient production methods and periodic stock check-ups permits the replenishment of bearing stocks in stock lots. This method results in lower unit costs, assures uniform alloys, and precision machining.

Because special emphasis was placed on bearings, as an important adjunct to the company's motor repair service, the special jobs that are outside the range of replacement stocks are also handled much more efficiently. The methods that have resulted in better stock production were found to serve equally as well in getting out individual rush orders quickly and economically.

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SALES ANALYSES CHART *To Sell Better Working Conditions*

PLANT OBJECTIVES	TYPES OF INDUSTRIAL SERVICES WHICH CAN HELP ATTAIN THESE OBJECTIVES	EQUIPMENT THAT CAN BE SOLD IN THIS TYPE OF MODERNIZATION
1 General Plant Safety	Complete safety check-up of plant wiring and machine drives, for possible code violations. Complete safety check-up of wiring for defects, grounds, live parts and possible causes of electrical accidents.	Modern dead-front panelboards, polarized wiring, static control, proper exit and stair lighting and emergency lighting, individual motor drive, explosion proof wiring, lighting equipment and motors, replacement material for defective wiring, phototube safety devices.
2 Individual Worker's Safety	Analyses of machine operations for possible applications of electrical safety devices. Inspection of electrical equipment for tripout blows, possibility of accidental starting of machinery. Inspection of automatic equipment for installation of "foolproof" starting and stopping.	Automatic and remote control, replacement of knife with safety-enclosed switches, heavy duty plugs and receptacles.
3 Proper Seeing Conditions	Foot candle study of illumination in all departments, check-up on quality of light.	Improved lighting equipment, phototube control of lighting.
4 Reduction of Discomfort and Fatigue	Follow-up of complaints of "spotty" plant heating, and recommendations on heating hard-to-heat places, check up on blower and fan applications.	Electric space heaters as auxiliaries to the main heating system, unit air conditioners.
5 Elimination of Unnecessary Noise	Inspection of mechanical power transmission and alignment of motor drives where noises and vibration are excessive.	Modern quiet-operating motors and drives; gearmotors.
6 Reduction of Waste Motion	Study of equipment controls to eliminate unnecessary stooping and straining.	Pushbutton controls within comfortable reach of operator, limit switches to stop equipment automatically.

EMPLOYEE FACTOR *in Industrial Sales*

EVERY plant management is vitally concerned with proper working conditions. The accompanying "Sales Analysis Chart"—the third in a series appearing in ELECTRICAL CONTRACTING—outlines how electrical contractors' services can be translated in terms of this immediate interest.

As with the preceding charts, the problem is analyzed "backwards"—that is, it is first broken down into the main objectives desired by all plants—in this case, general plant safety, individual worker's safety, proper seeing conditions, reduction of discomfort and fatigue, elimination of unnecessary noise, and reduction of waste motion—and referred back to what the contractor has to sell.

In this way, the customer's *self interest* can be used in selling improved working conditions.

The Need for Rewiring

by S. B. Williams
Editor, ELECTRICAL CONTRACTING

In its desire to obtain helpful sales views, the Clark and Mills Electric Company, electrical contractors, of Boston, Mass., during its fall rewiring campaign, conducted a weekly series of staff meetings which were addressed by various representatives of the industry. The following address which opened the series, analyzed customer need and usage. While many of these thoughts have appeared before in *Electrical Contracting*, this is the first time they have been brought together as a balanced sales approach for residential rewiring.

▼

THE need for wiring is twofold. The contractor needs it to earn a living, and the public needs it to live properly. The only difference is that the public does not know that it needs this wiring.

Every survey that has ever been made, and there have been a number of them, including one made by the J. Walter Thompson Agency at a cost of $25,000 and covering calls at five thousand homes, has shown definitely that the public has not sensed any want or need for wiring. In other words, in plain language, the public doesn't want any more wiring than it now has.

The Facts

When a survey, such as our magazine made in 1930 in one hundred and fifty cities in thirty-eight states, shows that in six out of every ten wired buildings there is dangerously defective wiring; when the growth in the number of electrical fires in New York City has been showing a rapidly increasing trend for the last four years; when a survey such as we made this spring in fifty-three houses that were being offered for rent in New York and New Jersey suburban areas shows 34 per cent of them to have screw receptacles, 11 per cent to have rotary flush switches, 52 per cent to have push-button switches, 64 per cent to have brass sockets in basements and bathrooms, commonly known as "shock sockets," and 58 per cent to have permanent cord wiring; when that same survey showed that two-thirds of the living rooms have two or less convenience outlets, and 13 per cent no switches; that 43 per cent of the bedrooms have no convenience outlets, and 77 per cent no switches, then I think the facts prove conclusively that there is a very definite need for wiring—wiring to provide for safety to life and to prevent fires; wiring to replace wornout, obsolete, inefficient wiring materials; wiring to make the use of electricity more convenient.

Between 1900 and 1928 this industry set out to wire all of the old buildings, and we had the erroneous idea that we had a wired building provided we got electric service into it in some fashion. We are suffering now from the results of that penny-wise and pound-foolish activity. The public came to believe that that was all that was needed, and almost nothing has been done since to change that viewpoint.

There have been many campaigns in this country to sell additional outlets. They have almost always been unsuccessful, and the reason is not hard to find. The public does not want any more wiring.

If we are going to develop a desire on the part of the public for more wiring, we must develop the need. When the copper and brass people wanted to substitute brass pipe for the old galvanized water pipe, it did not try to sell the public so many feet of pipe, but rather rust-proof water, absence of leaks, etc.

The point is this, that outside of the consumable class, such as food and clothes, we very seldom buy things as things; but we do buy the comfort, or health, or safety, or pleasure, or pride, or luxury that some product will give us. Therefore, in selling we must find the consumer appeal if we are to create a demand for our product.

One of the best approaches to the home market, of course, is that of safety. Defective wiring is a distinct fire and life hazard. Homes may be insured against loss from fire, but it is seldom that the insurance ever covers the full loss.

Will the insurance cover unreplacable old family heirlooms? Will it cover the fright and the scare to the family, or the colds and pneumonia that so often result from exposure on wintry nights? Will it cover the old photographs or the family Bible or the keepsakes of no intrinsic but tremendous sentimental value? Perhaps there is a collection in the house of stamps, or autographs, or old manuscripts, etc. Insurance cannot replace this. The firemen may trample over the flower beds and ruin the lawn, and perhaps destroy some flower specimens of which the owner is very proud. Insurance will not replace that. In other words, aside from the personal hazard of fire, there are lots of things in connection with it that insurance cannot protect.

Electrocutions

Then there is the personal hazard. One large insurance company gathered data on over 700 electrocutions in one year. A large percentage of these were in the home. The baby puts its finger into a screw receptacle. A person steps out of a bathtub to turn on the light. One turns on a grounded floor lamp with one hand while the other happens to be touching a radiator. There are innumerable ways in which electrocutions can occur, and do occur, in the home. What can ever collect for the loss of life?

In the matter of lighting, which, incidentally, is closely tied up with wiring, think how many broken backs would have been spared with good lighting on cellar stairs. Think of the number of nasty falls and bruised shins, perhaps broken bones, which would have been prevented if a wall switch were handy at the entrance to every room, so that one

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would not stumble about in the dark, trying to find a light. Think how many nasty cuts in shaving would be prevented with proper lighting.

Obsolescence

Going a little further, take up the mater of obsolete equipment. I have mentioned the number of homes that still have the old-fashioned push-button switch. How many of these switches really work 100 per cent of the time? Did you ever try them? Moreover, think of the setting that they are in, of the appearance of them. Don't they date a house? We change wall-paper, and decorations, and draperies, and frequently furniture. We do it largely because we want things that are more up to date, more attractive. Why don't we change these ugly old push-button and rotary flush switches.

And now to come to additional wiring for convenience and comfort. We once asked a large number of contractors how many convenience outlets a living room should have. Some said two, some said three, some said four, some said more than that. But one or two had wits enough to write back and say, "What living room?" One of our readers has a theory that the number of convenience outlets in a room depends upon the number of feet of wall space, and the length of an average lamp cord. He contends that the portion of the living room that is not reachable by a lamp cord is standing room only. If an owner objects to the number of convenience outlets necessary under this plan, then you merely ask that owner which portion of the living room he doesn't care to use so that it can be blocked off and kept in darkness and disuse. This is one approach.

Usage

Another approach is usage. A contractor in Florida boasts that he never leaves a house where he is working without attempting to sell a vacuum cleaner outlet. And he generally succeeds. He asks the woman of the house if she ever has to change the cord when going from room to room downstairs with her vacuum cleaner, and wouldn't she like to know how she could clean the whole downstairs without changing the cord once. Well, of course, we all know the answer. This contractor simply puts a convenience outlet in the central portion of the downstairs, so that a vacuum cleaner can be used in the living room, dining room, hall, and probably front stairs, all with one setting of the cord.

Then there is the keyhole light. It is nothing more nor less than a contact switch at the front door, but you tell people that it is for the purpose of finding the keyhole at night, particularly in the wintertime when one's hands get so cold fiddling around trying to find the keyhole. Everyone can understand what you are talking about, but there would not be a one who had any desire for an ordinary contact switch.

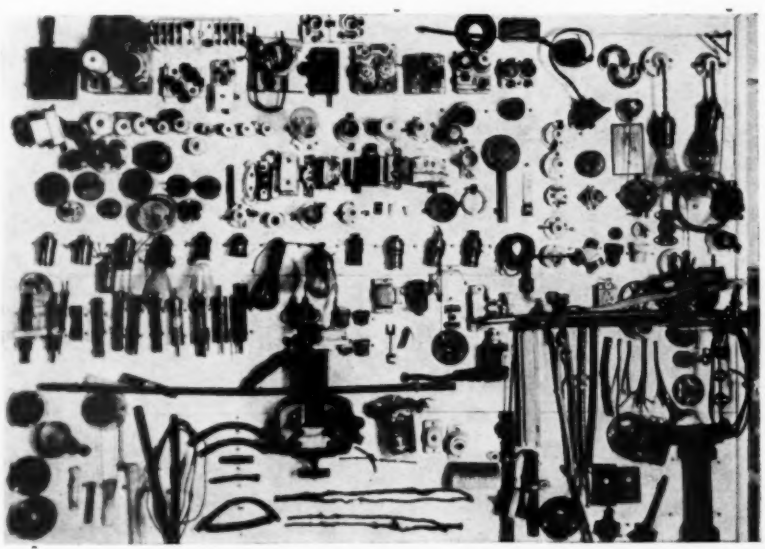
Vanity

If you will study homes for living, you will find a great many opportunities to sell the use to which the wiring will be put, but you must sell the use if you are going to get the name on the dotted line. It is also possible to sell vanity. I venture to say that in 90 per cent of the bedrooms that you go into, you will find the dressing table without sufficient light to enable the woman in the house to make up her face properly. This is a serious matter, because at night a woman requires an entirely different preparation of the skin in order to look her best.

Most women like to entertain. And the most common form of entertainment is cards. An evening at cards will go faster and with less interruption if there is proper light. It is not necessary to put in new fixtures, because we have the new indirect lamps. We must, however, have convenience outlets so located that we can use these lamps.

I shall not attempt to enumerate all of the various ways in which wiring can add to the comfort, health, safety and convenience of the family. It is enough to know that there is a very definite need for wiring, that the public will buy wiring when it senses the need that there is an opportunity to really sell. I make just this suggestion: That before you attempt to sell wiring, you know what the need is, you convince yourself of it, and you think of the sale in terms of the need, rather than in terms of the manner in which it can be accomplished, namely, wiring. In other words, sell the need, and the wiring will take care of itself.

In One Inspector's Experience:



H. S. Andrews, Kenmore, N. Y., who has been an electrical inspector for twenty-three years, started a number of years ago a collection not only of electrical antiques, but also of "horrible examples." These have been mounted on a board for display purposes. The antiques are in the upper part of the board, while the jumpered fuses, spliced wires and other examples of defective wiring are below. Is this not one more reason for public education on electrical hazards?

The Profit Side of Shop Cleanliness

A clean shop all day long

A ONE-MAN cleaning department is kept busy throughout the year by the Electric Motor Repair Company of Springfield, Mass., to maintain its far-flung reputation for motor service shop cleanliness. With twenty mechanics engaged in its various departments, this plant is as tidy at noonday or at quitting time as when the working day began.

John B. Tufts, president of this company doesn't pay his clean-up man solely for idealistic purposes. This cleaning cost is not considered overhead. Instead it is considered a valuable aid to lower production costs. Shop cleanliness also plays an important part in selling high grade work to discriminating customers.

Here are some of the direct advantages which keep the cleanup man free of lay-off worries:

1. Skilled mechanics are left free to concentrate their entire time on shop work. No time is lost in clearing away for the next job.

2. Clean benches and floors encourage mechanics to keep all their tools in order. No lost motion looking for covered-up wrenches, gauges, files, etc.

3. Workmen gradually became exacting about material waste, spoilage or damage. Clean floors and benches quickly reveal careless estimates of cut-offs and shearings.

4. Odd motor parts can't "hide out" from an assembler when the benches and floors are kept clean.

5. A clean shop encourages tidy mechanics; a direct asset on outside calls, also when important prospects or customers inspect the shop.

6. Clean working conditions insure that tapes and insulation linens remain free of oil or grease stains before impregnation. Harmful grit, iron filings, or chips or other foreign substances are also unlikely to get into windings or bearings.

Not all of this shop's fine reputation for quality work and cleanliness can be laid to this constant "policing" with broom, mop and water. The original layout was designed to isolate dirty jobs from clean jobs as much as possible. Likewise metal work is done away from electrical repair benches. The winding department, for instance, is partitioned off at the extreme end of the shop. Its benches are therefore saved from abuse, and receive a monthly scrubbing with soap and water, in addition to daily wipe-downs.

In contrast to the winding room, the well-known grime of motor stripping and parts cleaning leaves no smudge in this shop. Its dirty work is done in a ventilated metal-clad room. A floor drain permits quick hosings without interference to other shop workers. Small motor repairs are also confined to a separate room, but all new windings for small motors are made in the coil department.

The concrete floors are scrubbed regularly with a grease solvent solution. Because the dirty work areas are isolated from cleaner operations, the scrubbings can be localized according to the need. The net result is a clean concrete floor everywhere. No slipping or falling occurs because of grease-filmed floors, and therefore there is less likelihood of injuries, of dropped instruments, tools or apparatus. Likewise, there is less deterioration of long test leads, cables and portable cords, due to minimized floor oil and grease.

Fundamental rules are an important part of keeping this shop in order throughout the day. First of all, each piece of equipment must be kept moving to its next base of operations. Thus a re-wound stator goes to the oven for preheating as soon as cleared by the winder. No department is permitted to let completed operations clutter valuable working space. Likewise, no junk or broken parts will be found in any productive department, nor to mar the appearance of displayed stocks. If any parts are valuable, they become the stock room clerk's responsibility. If of no value, they are not allowed to become mixed up with valuable parts, or to interfere with or confuse busy workmen. Nothing is left to stand around.

A second important rule is the "evening pickup." Each mechanic must clear his bench of all tools, and place all apparatus parts in his job "tote" box within a given "pick-up" period at closing time. This practice results in a fixed responsibility for each mechanic when beginning a job on the following day. There can be no squabbling over the mysterious disappearance of a bearing, a starting switch, or of tools, since knocking off on the night before.

Here then, one finds a man going about the shop all day with broom or mop; he wipes up grease or oil with some waste, and keeps house all day long. Does it pay? Mr. Tufts thinks so. He observes the manufacturers doing it too. And, having been an advertising man in earlier years, he likes to cite the friendly comment which comes from important industrial customers who make occasional visits to the shop. Business is good—evidently there is a point to shop cleanliness.

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Construction . . Methods . . . .

Heavy Cable Wireway for Close Quarters

A sheet steel wireway was installed for enclosing four 1,500,000 c.m. main feeder cables between a 1,000-amp. main switch and main light distribution panelboard in a

crowded switch room of the Suffolk Downs racing plant at East Boston, Mass. This layout of Quinn Brothers, Boston contractors, permitted these heavy connections being made in a limited space. A 6-in. deep, 18-in. high wireway was built to fit the inside corner walls. Removable front covers allowed the cables to be laid in place, and shaped to correct alignment with their lug connections at both ends. This work was done without requiring injurious bends in heavy cables, thus simplifying the cable installation and makeup work.

Aligning Multiple Switch Fittings

Groups of flush switch outlets that must be installed on rough wall surfaces to line up exactly flush with a final layer of tile require rigid supports. Such a condition was en-

countered by the Paul Wendt Electric Company of St. Louis, Mo., in remodeling a wholesale meat storage plant. A number of threaded hub-switch fittings were grouped on a cork-insulated wall. Horizontal ¾-in. conduits were tied with iron wire to the face and upper edges of this row of fittings to serve as straight edges until the tile setting was completed. This method eliminated the need of strapping these fittings to the friable blocks of cork insulation and also avoided puncturing it. The various circuit conduits were thus held secure in a gang, and in uniform alignment with the future wall line as well as in a horizontal plane.

Progress Chart for Special Materials

Industrial and commercial jobs often require special items of equipment and material that are slow in shipment. To simplify the handling of such jobs McCarthy Bros. & Ford, Buffalo, N. Y., developed a "Progress, Material and Cost Chart." All special items are taken from the estimate sheets and posted upon one or more pages of this form, showing the quantity of each item, its description or name, and from whom it is to be bought. Columns are provided for inserting the order number, supplier's number, also special drawing numbers. A set of symbols at the top of this form represent various stages of progress in the procurement of these items, viz: When ordered, when promised, whether approval is required, etc. These symbols are noted within one of the month columns of this form, until a particular item may be checked along a horizontal line to the completed transaction.

These charts are 11½ in. high and 22¾ in. wide, printed in stock quanti-

LIST NO. _____ SHEET 1 OF 2
MADE BY: WAB DATE 7-25-32
CHECKED _____ REVISED _____
APPROVED _____

PROGRESS, MATERIAL AND COST CHART
MC CARTHY BROS. & FORD BUFFALO, N.Y.

ENG. CONT. NO. 3564
ENG. ORDER NO. _____
SHOP ORDER NO. _____

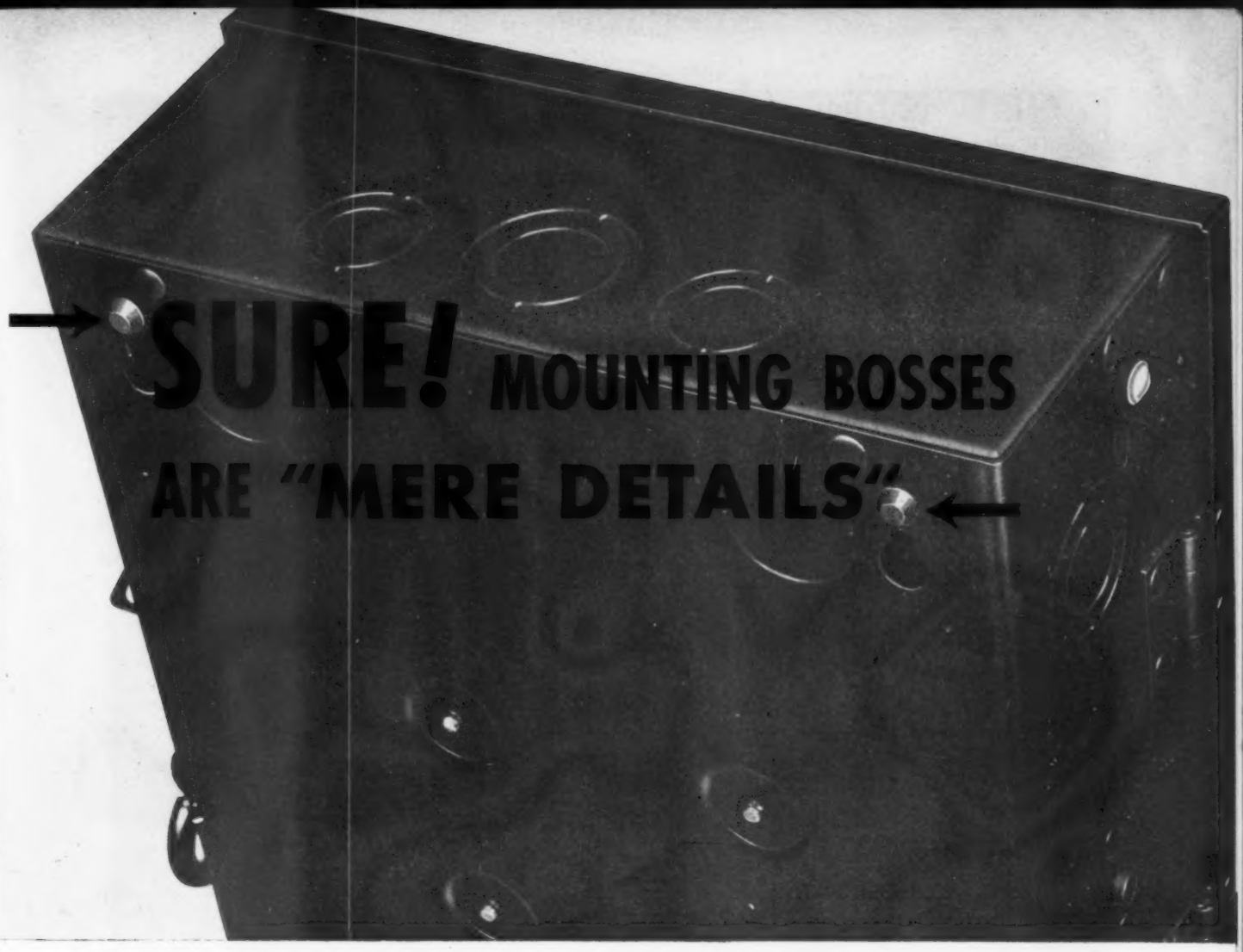
FOR Wisconsin Bridge & Iron Company
JOB Michigan Avenue Bridge over Buffalo River Buffalo, N.Y.

ORDER PLACED
SHIPMENT PROMISED
SHIPPED
RECEIVED
IN REPAIR SHOP
SHOP WORK COMPLETED
INSTALLATION BEGUN
INSTALLATION COMPLETED

4th FLOOR STOCK
PARTIAL SHIPMENT
RELEASED FOR SHOP
APPROVAL REQ.
D.I.M. PROVED
RELEASED FOR SHIP.

COST DATA
CONTRACT PRICE _____
ACTUAL COST _____
PROFIT & OVERHEAD _____

NO. ORD.	NAME OF PART	FROM	ORDER NO.	THEIR ORDER NO.	DRAWING NO.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	REMARKS	MATERIAL COST	LABOR COST	PRIME COST	UNIT COST
						1935						1936										
1	Primary Panel	Warren Trumbull	Ordered			✓												Ord. Mar. 28/35 Rec'd				
6	Primary Cut Outs Type EJ	Wagner Trumbull	-			✓																
2	5 Kva. 2200/440 3 ph 60 cy Transfo	Warren Trumbull	-			✓																
3	3 - " " " "	Warren Trumbull	-			✓																
1	200 kw Motor Generator	G.W. Item 12	4555		50-1105	✓												Rec'd Approved 8/26/35				
1	100 kw Generator + Exciter	G.W. Item 1	4555		50-1104	✓												Rec'd Approved 8/26/35				
1	100 HP 220 v DC Shunt Motor	G.W. Item 2	4555		50-1103	✓												Rec'd Approved 8/26/35				
8	Barrels Gate Motor Starters	G.W. Item 21	4555															Completed 9/20/35				
5	Cradling " "	G.W. Item 20	4555															Ship Expected to Dock 10/2/35				
1	Magnetic Brakes 150 HP DC	G.W. Item 19	4555															Rec'd Appr. 8/20/35				
5	2 HP 220 V 60 Cy 1200 RPM Motor	G.W. Item 18	4555																			
5	2 HP Motor Starters, 3 Pole, 60	G.W. Item 17	4555		50-1095																	
10	12" Brackets	G.W. Item 16	4555		50-1104													Rec'd Appr. 8/20/35				
33	12" "	G.W. Item 17	4555		50-1105													Rec'd Appr. 8/20/35				
1	600 Amp 3 Pole Type FDH Circuit	Westinghouse Item 19	Ordered			✓																
1	3 Pole Control Sw. Bd.	G.W. Item 3	4555																			
1	Control Panel	G.W. Item 11	4555																			
	Limit Switches	G.W. Item 14	4555																			
1	Starting Bd. Pole Sw.	G.W. Item 4	4555																			
1	Meters " "	G.W. Item 10	4555																			
8	Fahrenheim Stations	G.W. Item 5	4555																			
2	Automatic Pressure	Ballwin Supply Co	4511																			
8	Flush Boxes "	"	-																			
2	Flush Receptacles + Plugs	Crouse Hinds	4543																			
2	" " "	" "	4543																			
6	Watt Hour Meters + Mounting	" "	4526																			
2	Meter Panels + Cupboards	" "	-																			
6	Conduit Work Complete	" "	-																			
3	" " "	" "	-																			
3	Service Switches	Cutler Hammer	4555			✓																
1	" " Series 2"	Standard Switchboard	4555																			
1	Automatic Transfer Sw.	G.W. Item 8	4555															Rec'd 9/17/35				
18	Scale Dial Lights	Wagner Item V	Ordered															Rec'd 9/17/35				
1	Air Voltmeter	G.E. Supply	4511															Rec'd 9/16/35				
1	Air Compressor + Motor + Conn.	Curtiss Prem	4513															Ordered Shipped by G.W.S.C. 9/16/35				
1	1 HP 1750 RPM 60 Cy Conn. Motor	G.W. Item 13	4555															Rec'd Appr. 9/16/35				
20	Air Hose + Valves	Brass Mfg. Supply Co.	-															Rec'd Appr. 9/16/35				
2	Telephones + Cords	Graybar	4521																			
2	Power + Light Panels	Westinghouse Item 20	Ordered																			
1	W.P. Cabinet for 2 Telephones	Bassett Item 21	Ordered																			
2	Safety Cages	Fabricated	4510																			
2	" Motors	"	-																			
2	" Lights	"	-																			
6	High Stop Signs	Wallis Sign	4553																			



SURE! MOUNTING BOSSES ARE "MERE DETAILS"

SO many details are "out of sight, out of mind" on Safety Switches. Mounting bosses, for instance. They're in back, and hence often forgotten by both the buyer and the switch manufacturer.

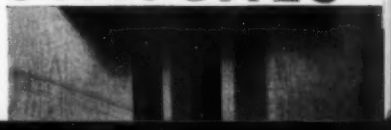
But later they may come to mind forcibly. When switches are installed on an uneven surface, a box without mounting bosses can cause a wobbly and unworkmanlike job. And if water drips down the wall it's bound to rust out the back and seep into the working parts, bringing justified complaints.

Mounting bosses are just another big "little detail" that's remembered in C-H Safety Switch design. C-H mounting bosses make a box set square and true on nearly any surface, and they keep the box off the wall; water runs down harmlessly, and stays out of the box . . . C-H Keyhole mounting slots are another "detail"—they permit you to put in mounting screws first, then hang the box, and that's that.

Compare C-H Safety Switches detail by detail and you will buy the way C-H manufactures—with regard for the so-called "details" that add up to *performance* and *satisfaction!* . . . Featured by alert contractors and independent electrical wholesalers everywhere. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1306 St. Paul Avenue, Milwaukee, Wisconsin.

● *The C-H line includes all types and sizes of Standard, Weatherproof and Explosion-Proof Safety Switches, and Range Switches and Service Equipment for every locality — all built to the famous C-H Control Leadership Standards.*

CUTLER-HAMMER C-H SAFETY SWITCHES



UMI

GREENLEE
PROFIT MAKERS
For The Electrical Contractor

THE greater the efficiency of the tools you use, the more chance you have of meeting competition and making a profit on each job. That is why Greenlee Conduit Benders and Knockout Tools are so popular. They cut costs on every job and are liked by the men who use them.

Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits, because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire and cable. They are easy to take to the job, too, because they are readily portable.

Knockout Tools

Greenlee Knockout Punches and Cutters are time savers and profit makers, because they make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without any reaming or filing.

Other Tools

Hydraulic Pipe Pushers
Joist Borers — Bit Extensions
Electricians' Bits

Let us send complete information, without obligation to you. Just use the convenient coupon.

GREENLEE TOOL CO.
ROCKFORD, ILLINOIS

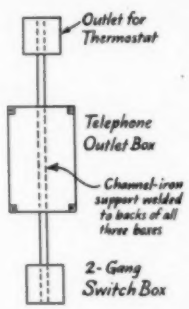
GREENLEE TOOL CO.
ROCKFORD, ILLINOIS
Please send complete information on the following:
☐ Conduit Benders
☐ Knockout Tools

Name .....
Street .....
City .....
State .....
My Jobber is.....12-35

ties on linen tracing cloth. All postings are made to this form with India ink, thus making it possible to secure good blue prints of the original for job superintendents and other interested departments. By keeping these postings up to date, it is always possible to analyze the status of any large job orders quickly without reviewing correspondence files. Furthermore, by making additional prints from time to time, everyone has a complete record from start to finish of every such item in question.

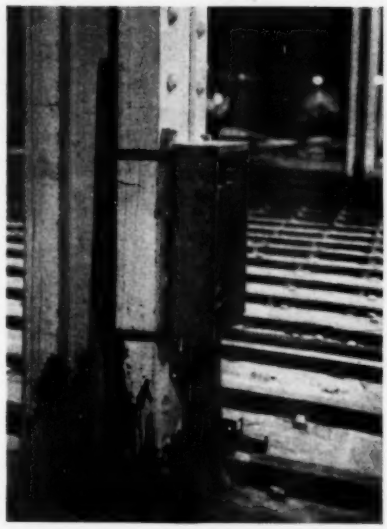
Welded Straps for Tandem Outlets

Three outlets occurred directly above each other at about eighty locations in a new high school at Jamestown, N. Y. The task of keeping them in perfect vertical alignment caused the Linquest Electric Company to spot-weld them to a common back-strap of light channel iron at a cost of about 25 cents per set. This provided a rigid assembly for roughing in which resulted in exactly centered outlets between the adjacent blackboard panels of the various classrooms. The labor saved in pre-aligning these outlet boxes was claimed to have more than offset the cost of welding them to the channel iron.



Cabinet Mounting Straps Save Drillings

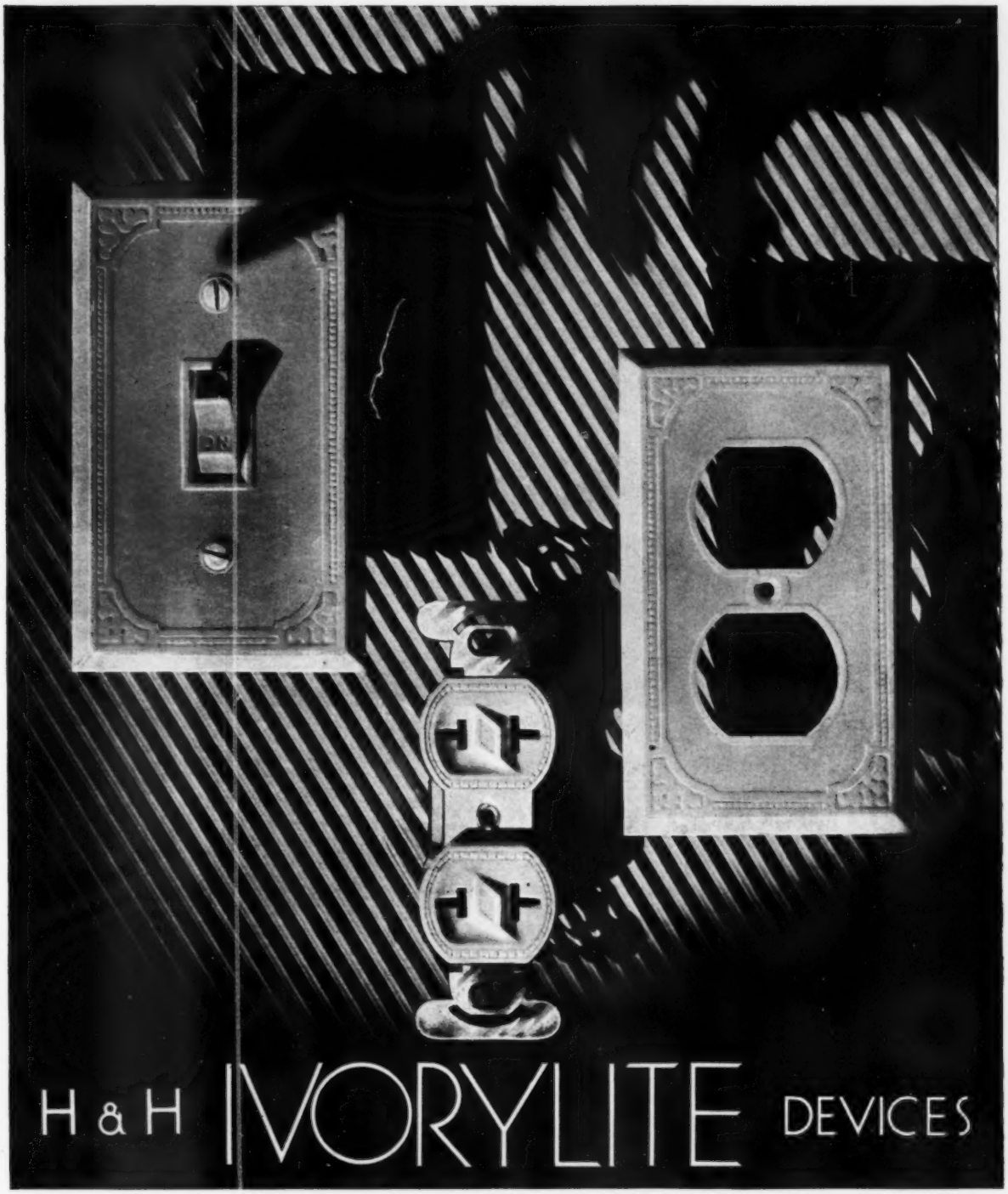
A large number of small steel cabinets for 60-amp. switches had to be installed against heavy steel H-columns in the exhibition area of a new armory at Baltimore, Md. They were also to finish flush with the vitrified tile column furring. Because these columns were about an inch thick, the H. P. Foley Company employed a pair of ¼-in. by ¾-in. flat iron mounting straps per cabinet which were formed around the column flanges to provide a suitable support



without having to drill the thick steel. Because each cabinet rested upon one or more conduit stubs for vertical support, these iron straps, when hammered back around the column flanges permitted the cabinet being plumbed to the finish line by driving wooden wedges between the column face and the straps, as required. Each strap was bolted to the back of cabinet in two places.

Rigid Conduit— E.M.T. Expansion Joints

A slip-fit expansion joint was recently made of conduit and electrical metallic tubing for bridging across the expansion slots in a large institutional project in Westchester County, N. Y. All conduit runs were butted after careful reaming at the centerline of these slots. They were then sleeved with short pieces of electrical metallic tubing to pro-



IVORYLITE is a cream-tinted, white moulded material, *ivory-like* in appearance and of solid color throughout. It is *not a finish* and will not chip, flake or wear off. When soiled it is easily cleaned with a damp cloth. Plates have the same attractive border as the regular brown. . .

Switch handles, Receptacles and Plates of IVORYLITE harmonize with light interiors and are less conspicuous on walls. IVORYLITE Devices include Flush Switches and Receptacles — Duplex and Radio — with Plates. Ask for illustrated page supplement to your regular catalog. . .

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD. CONN.

UMI

FUSES MADE TO PROTECT...NOT TO BLOW

GET THE FACTS:

"We have experienced difficulty on 800 ampere, three phase circuit (two 400 ampere fuses on each phase) which fed motors driving compressors . . . These fuses were letting go on an average of once a week until we replaced them with BUSS SUPER-LAG . . . Since then we have been running 3 months without a failure. Our shutdown worries have been eliminated."

So said Chief Electrician Deardorff of UNIVERSAL GYPSUM & LIME CO., York, Pa., in Fall of 1930. At a re-check on Sept. 25, 1935 he added—"these fuses are still in service not having blown since installation"—They are now starting their second 5 years of blow-free protection—see title of booklet.

EXECUTIVES DO NOT ALWAYS INTEREST THEMSELVES IN FUSES BUT THEY DO GET SEARCHINGLY INTERESTED IN.....

UMI

.....the RECURRING SHUTDOWNS caused by NEEDLESS BLOWS

"made to *protect* not to blow" is not a new departure with BUSS Fuses. It has been preached to maintenance men, production men, engineers and executives since the advent of the BUSS SUPER-LAG FUSE.

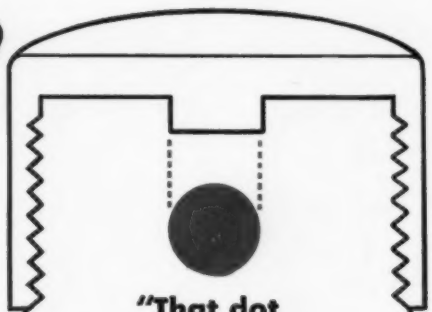
Thousands are profiting handsomely from INVESTIGATING the costs of and reasons for fool shutdowns caused by "self-blowing" fuses.

By charging those shutdown costs smack up against the fuses themselves the buyers now have a sane measure to judge fuse prices. Investigate....

WHY BUSS FUSES DON'T BLOW NEEDLESSLY

10 FEATURES in the design of the FUSE-CASE help make it possible and....

The Super-Lag development in the FUSE LINK completes the job.



"That dot is worth a million dollars to industry"

says a round-number enthusiast

to which our serious reply is "AND LOTS MORE"... for without that patented BUSS projection the contact between cap and link would be decidedly haphazard, beckoning for a self-imposed blow and a NEEDLESS shutdown.

But WITH it the entire force of screwing down the cap is concentrated in the small area of the projection.

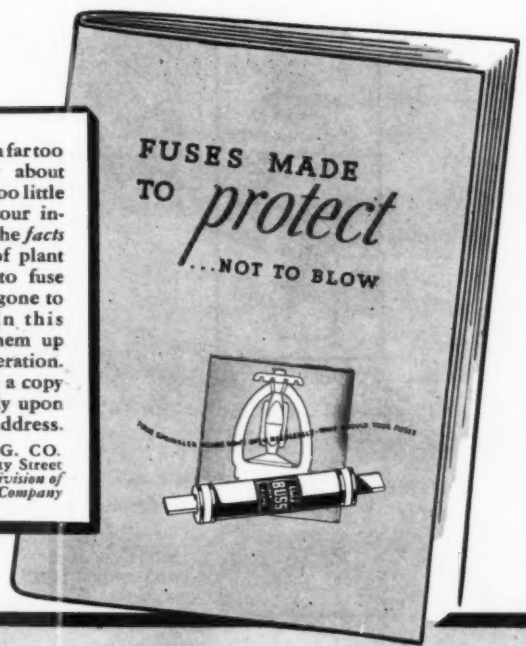
This heavy grinding pressure overcomes the slight irregularities, burrs, etc., that might interfere with ample contact.

Can't you picture the SURENESS of dirty contact as well as inadequate contact pressure if the projection were not there?

GET THE FACTS

THERE has been far too much theory about fuse action—far too little fact. Assuming your interest in getting the *facts* on the relation of plant operating costs to fuse design, we have gone to great lengths in this booklet to set them up for your consideration. We will mail you a copy gratis immediately upon receipt of your address.

BUSSMANN MFG. CO.
2536 West University Street
St. Louis, Mo.... *A Division of the McGraw Electric Company*



BUSS super-lag FUSES

UMI

THE WIREMOLD ZONE

THERE IS A WIREMOLD ZONE OF USEFULNESS AND PROFIT IN EVERY FIELD OF WIRING PRACTICE!

NUMBER 13 OF A SERIES ON WIRING OPPORTUNITIES

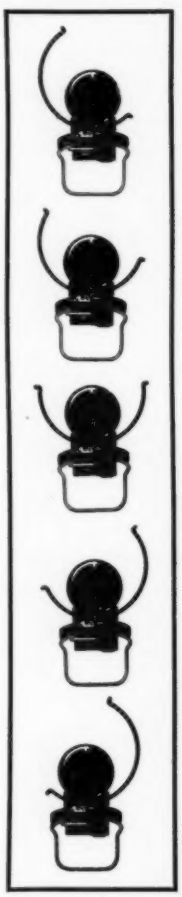
ANOTHER EXAMPLE:

The WIREMOLD Five Way REFLECTOR

See how it multiplies the USEFULNESS of LUMILINE LAMPS!

THE cross sections at right show how the Wiremold FIVE WAY REFLECTOR is installed with Wiremold Lumiline Lampholder Bases mounted on Wiremold Lighting Strip—to suit the requirements on each job!

¶ Another place where Wiremold makes it easier to sell and please the prospective customer—and handle the job at a profit!



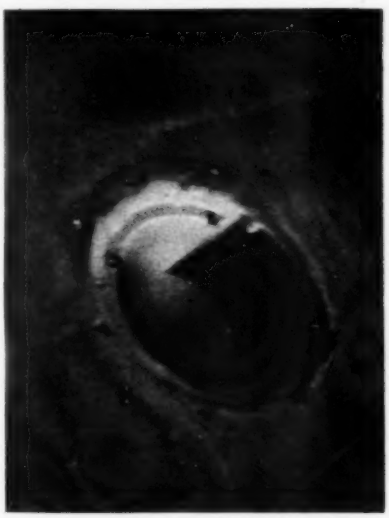
Wiremold HELPS the Contractor

THE WIREMOLD COMPANY, Hartford, Conn.

vide a metallic enclosure to take care of an anticipated building expansion of about ¼ in. The ½-in. runs were provided with extra long threads and equipped with couplings, which were run back square with the end of the conduit. These couplings were used because they provided a reasonably tight fit for 1-in. tubing sleeves. The ¾-in. conduit runs were also sleeved with 1-in. tubing, while 1-in. conduit runs required 1¼-in. tubing sleeves. Friction tape was applied over each end of the sleeves to keep them in place and to exclude cement grout or grit. Ground clamps and No. 8 bonding jumpers are to be used for bonding each severed run. No mechanical injury to these bonds is anticipated, because parallel masonry walls are to be built on each side of the expansion slots, which will place these connections within the hollow partition spaces. This installation is being made by the Whiffen Electric Company, Inc., White Plains, N. Y.

Space-Saving Stair Domes in Concrete Slabs

Cast metal dome fixture housings were installed in the sloping concrete ceiling forms over stairs leading up from a cross-tunnel to the various train platforms in a Syracuse, N. Y.,



depot job. This provided practically flush units, thus making full use of the overhead clearances without interference from projecting fixtures. Because of the construction of these units the dome lenses will be easily removable from the bottom, with liberal access space left available to reach the wiring pocket and socket mounting. These units were installed by the Edward Joy Company, Syracuse, N. Y.

ALCOA ALUMINUM BUS
is dollars and sense Economy

● To deliver the *best* bus installation that money can buy, at a saving to the owner, and a profit for you, specify Alcoa Aluminum. *Best* means by every standard, electrical, thermal, and mechanical.

The *per-foot* cost of the bus itself is *very* reasonable, whether the system demands the extra-heavy current carrying capacity of Channeluminum, or the more traditional flat or tubular shapes.

Aluminum Bus weighs at least 52% less. Its strength-weight ratio is high. That means definite cash savings in supporting structure. Often it is possible to locate the run on existing supports where other types of bus would be too heavy.

Lightness means easy handling, quicker erection. Joints may be either bolted or welded. Either technique is fast, workmanlike, and permanently efficient. Fittings are simple and inexpensive.

All these facts add up to one thing: Alcoa Aluminum Bus should be your standard basis for quotation. We have the details, the data. They are yours for the asking. ALUMINUM COMPANY OF AMERICA, 1897 Gulf Bldg., Pittsburgh, Pa.

ALCOA

ALCOA · ALUMINUM

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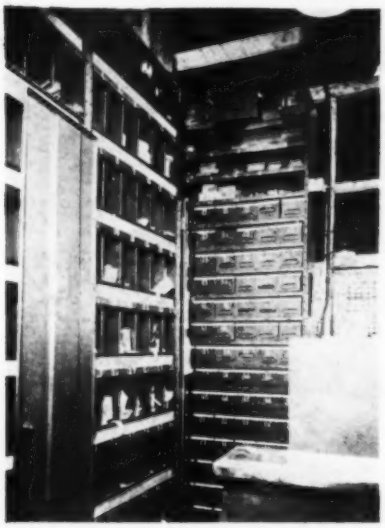
Service Shop... Practice.....

Zoned Stock Control System

Berger Bros. Electric Motors, Inc., Rochester, N. Y., employs a combination letter and number code for identifying its stock in the various bins and drawers, and also upon the



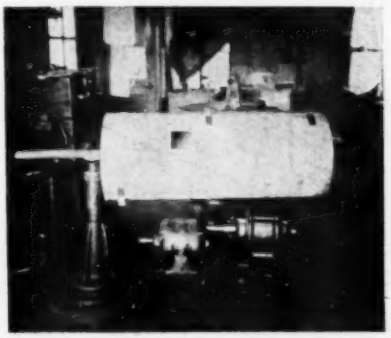
stock record cards. The various classes of stock have been designated alphabetically and placed in groups or sections of the stockroom which are lettered from "A" to "Z" to correspond. The varying sizes, types and makes of an alphabetical group are placed in adjoining bins or drawers to which consecutive numbers have been assigned and stenciled thereon. Thus the "A" section may contain sleeve bearings, involving a series of numbers beginning with "A-1" on the stock card listings. Likewise the "B" section may contain contact fingers for drum controllers and magnetic switches, beginning with a new "B" number series, "B-1," "B-2," etc.

In the partial view of small parts bins that is shown, the left tier is designated as "D" section. The stenciled bin numbers may be seen on each dividing rail. Large steel double doors which cover a part of these bins are folded open to show these bin numbers. These doors are stenciled with a large letter "D" on the front. The "E" tier in the center background includes a battery of steel drawers, some of which are subdivided to allow the storage of two or more sizes of small brushes, washers, etc., in one drawer. In such cases, only one number has been assigned, to avoid complications in accumulating top-heavy numbering and stenciling.

Since each departmental stock room has a visible card index containing stock cards of all the material under its control, a glance at a particular card reveals the letter-prefixed number that designates the section and drawer or bin number where that item may be found. This speeds up the checking of stock, and the filling of orders for miscellaneous materials.

Cylindrical Oven for Clamp-On Use

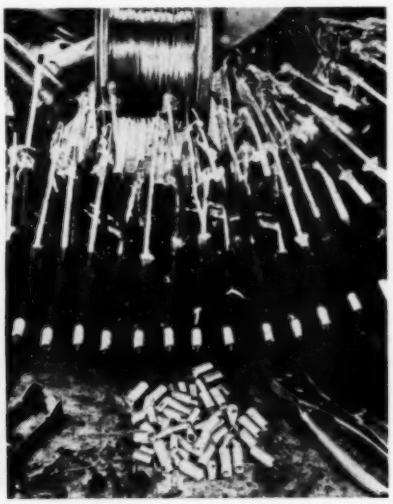
A four-piece sheet-steel housing which may be clamped around large armatures or rotors was made by Francis Pautz of Elmira, N. Y., for use with space heaters as a bake oven. It is made in telescoping halves, each of which is split and has hinges and hasps by which to open it up and for placing it around the apparatus. A sliding door is provided in one section for inspection and ventilating purposes. The ends have holes for clearing the ends of shafts. This outfit is said to give satisfactory results in baking out



equipment which is too long for the permanent oven equipment of smaller shops. Portable space heaters may be installed inside this housing as desired with their connections brought in through porcelain bushings at either or both ends.

Wire Coils for Stubbing Heavy Stator Windings

Tinned copper coils are made up for telescoping and soldering the stubbed windings of large stators which are rewound by McCarthy Bros. and Ford, Buffalo, N. Y. A 50 hp., 440-volt, 3-ph. 25 cy., 715 r.p.m. Westinghouse type C.S. stator is shown. This was rewound with .115 by .147-in. flat wire, using 72 coils, each with eight turns. These coils were connected 4-pole, 3-phase, series delta, six coils per group. Because of the difficulty involved in crossing this heavy flat wire at the coil knuckles, and the possibility of pinching the conductor insulation, a series stub joint was made. With the thorough and com-



WE EXTEND OUR WISHES

THAT YOU AND YOUR CUSTOMERS

WILL HAVE A MORE PROSPEROUS

AND A BRIGHTER YEAR WITH

SANGAMO

TIME-SWITCHES

● Business has been good in 1935 but unfailing signs point to further improvement in 1936.

Sangamo Time-Switch sales have shown a steady increase and for 1936 they should show even further strides to a new high.

You have played an important part in the universal acceptance of these precision made time-switches and our appreciation of your faith is sincere. It is our hope and desire that 1936 will be your biggest time-switch year and that Sangamo Time-Switches will help you make it unusually profitable.

● Sangamo Time-Switches are precision made and there is one to fill any application you may have.

SANGAMO ELECTRIC COMPANY • SPRINGFIELD, ILLINOIS

UMI

EXTRA!!

ELECTRICAL INSPECTORS VOTE 4 TO 1 IN FAVOR OF A

More General Use of the Knob and Tube System

Porcelain is still KING OF ALL electrical insulation materials! A recent survey conducted by this organization proves it! By a landslide vote Electrical inspectors for municipalities, insurance and utility companies favored the use of knob and tube as outlined in the National Electrical Code, 1935 edition. They went even further and by a 4 to 1 vote favored an even more general use of this wiring system. Their reasons: Absolute SAFETY, LONG LIFE, lower cost per outlet, more adaptable to damp location wiring, minimum accidental shock hazard, etc. A complete analysis of this survey and installation rules will be sent to you without cost or obligation. Every Electrical contractor who wants to increase his sales and profits should write immediately to Dept. D.

Illinois Electric Porcelain Co., Mazomb, Ill.
Superior Porcelain Company, Parkersburg, W. Va.
Universal Clay Products Company, Sandusky, Ohio
Porcelain Products, Inc., Parkersburg, W. Va.
Central Porcelain Company, Columbiana, Ohio
Ceramic Specialties Co., East Liverpool, Ohio
Knox Porcelain Corporation, Knoxville, Tenn.

USE Porcelain Safety Economy Permanence

STANDARD ELECTRICAL PORCELAIN MANUFACTURERS

201 N. WELLS ST., CHICAGO, ILLINOIS

Actual Size 5/8" Thick

McGILL

THIN MODEL

Levolier

No. 41

6 Amp.

The Levolier Thin model Switch No. 41 is an achievement in small switches. The above actual size picture shows it is not over ⅝ of an inch in thickness. In spite of its smallness, it retains all of the practical characteristics of the famous Levolier line. It is the smallest 6 amp. switch made.

At the left are shown six logical uses for this practical Levolier, which may be secured in three different stem lengths. You'll make no mistake in ordering these Levolier Thin Model Switches.

McGILL MANUFACTURING CO.
Electrical Specialties of Quality
ESTABLISHED 1904
VALPARAISO · INDIANA
Box No. 670

pact joint secured by sweating telescoping copper coils over these stub joints, they are bent back into final position between adjoining knuckle spaces with an added layer of fish paper separation. The stub joint sweating coils are made up on a lathe of ten turns of No. 17 bare tinned copper wire. The diameter of these coils is made of a size to suit the size of wire comprising a joint. After these coils are in place, it is found that they flux thoroughly all around, thus forming a solid mass of soldered copper contact for heavy current values.

Re-Insulating Oil-Soaked Windings

Megohmmeter tests will often reveal extremely low insulation resistance values in oil-soaked motor windings. Not all such insulation has, however, become hopelessly deteriorated. A large percentage of such deficient windings have been restored to good condition at nominal cost in the service shop of the Electrical Installation Company, Cambridge, Mass., according to Paul L. Keating, engineer and shop superintendent. A systematized baking-out and re-impregnating procedure is employed by this company which has resulted in the modernization of many motors that had been subjected to long years of exposure to lint flyings and the excessive absorption of lubricating oil by the stator windings.

The stator is first baked at about 235 deg. F. until oil begins to bubble or "bleed" to the surface. This bleeding action usually starts after three or four hours of baking, but in some instances not until after three days of continuous baking. In one instance about five gallons of oil was removed from a stator in this baking process. While the stator is still hot its windings are washed down in the spray room with naphtha. This removes the surface accumulation of oil that has not already drained off. Further bakings are continued until no further bleeding takes place.

When all the oil has been baked out and the surfaces are thoroughly cleaned of oil, the stator is submerged while still hot, in the varnish tank. Two dippings are given, each followed by a twelve to fifteen hour bake. Final megohmmeter tests show many of these windings restored to practically infinity values.

This work is done at a charge of about $15.00 for motors of 5 hp. and

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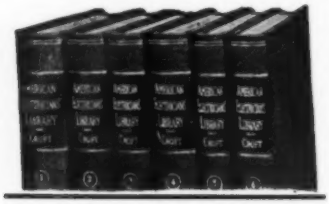

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smaller, while large motors up to 100 hp. run about $1.00 per horsepower. Medium-size motors require about 25 gal. of naphtha for the wash-off work. Because the bleeding point varies somewhat, and because the number of successive bakings that may be required will also vary, a motor is usually in the shop for two weeks while being reconditioned.

Because accumulated oil tends to form a film that holds old insulation together, some old stators that are once baked free of oil can never be restored except by new windings. In such cases the life is entirely gone from the cotton fibre. Such small insulation values as existed were being sustained by the oil film, and are completely gone when the oil bleeding has occurred. This company has found it necessary to rewind about one stator in fifty oil-soaked jobs.

Tests for determining the advisability of restoring windings by oil removal, rather than by rewinding, are limited to the main stator leads. Old windings are never opened up at the phase group joints, because of their brittle condition. The unavoidable bending or flexing of this insulation while opening up these joints would create breaks that could cause a great amount of trouble sooner or later. Experience has shown the logical breakdown point to be on the slot-ends, and that group tests will roughly determine whether the windings are worth restoration.

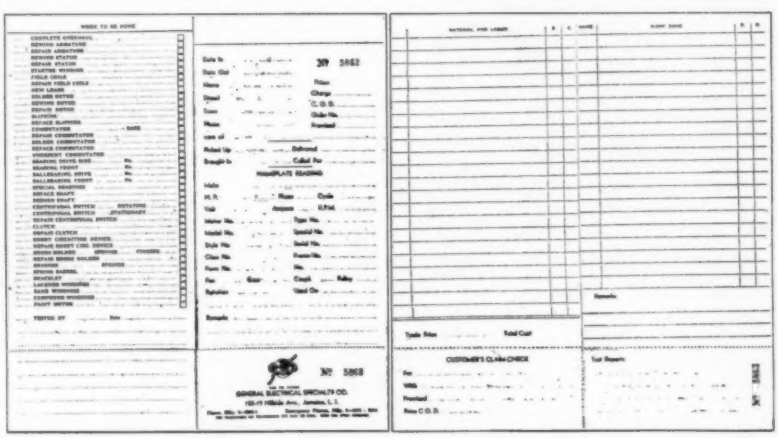
Among the larger group restoration cases which have shown worthwhile results for this company is a textile mill in Massachusetts. Twelve 100 hp., 900 r.p.m. induction motors that had been operated for over thirteen years were re-insulated in this manner about five years ago, after one had burned out. All of these motors are still operating efficiently and without insulation trouble. Other large plants for whom similar work has been done now have regular departmental motor re-insulation schedules. Each year the motors in a certain department are sent to the Electrical Installation Company until they have all been gone over in this manner. Because the atmospheric surroundings, excessive motor lubrication and age of insulation are varying factors in determining the life of motors, Mr. Keating recommends periodic megohmmeter tests to his customers. Any motors which indicate deterioration or lowered insulation resistance can thus be baked out and re-impregnated at a saving of time and money.

Composite Job Record Form

A printed form is employed by the General Electrical Specialty Company, Jamaica, L. I., which provides a complete record of each motor repair service operation without requiring the use of additional requisition blanks to cover the material, time or expense involved. A 10-in. wide and 11-in. high form was developed which was provided with a vertical folding crease. Thus a four-page folder record only 5 in. wide, is available. Its front cover provides spaces for filling in various job details and equipment data, while the back cover has 42 selected motor repair operations printed in for quick checking. This operations list cuts down the need for long-hand entries by shopmen.

Inside this folder record are horizontally ruled entry lines for posting material items and shop labor. These important entries are thus shielded from becoming smudged or blotted with grease, and remain more legible for copying by the billing clerk.

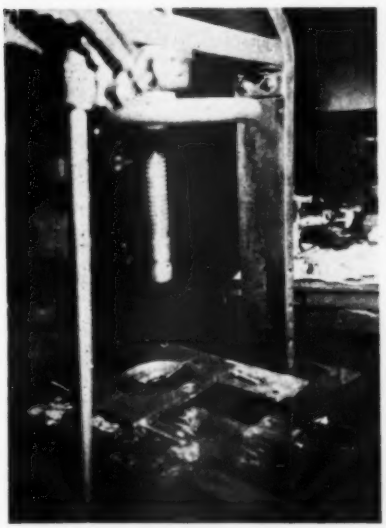
The bottom ends of each half of this folder are perforated for removal, thus providing two 2-in. by 5-in. detachable cardboard records,



each numbered like the master form. The front cover card is used as a customer claim check while the one on the back cover is used for special test information, or for recording any unusual characteristics of equipment being repaired. The latter form is filed in a separate card tray for future reference on similar equipment. This remains available independent of the actual job cost records.

Sectional Pulley Removing Plates

A pair of machined steel plates that were made from ¾-in. thick stock are used for blocking around motor shafts for pressing off pulleys, pinions, certain types of end shields and the inner bearing races of vacuum cleaner motors. These plates



rest upon the I-beam bed plates of a standard wheel press. They may be assembled with the opposite halves of concave or saucer-like edges adjoining. These machined down edges are sufficiently thin to slip into closely assembled pulleys or pinions. After these halves are butted, two ⅞-in. take-up bolts with wing nuts are tightened to hold them together around the motor shaft. The larger concave surfaces are 2¾ in. deep, on a 3¼-in. radius, while the opposite edge of each plate has a concave surface which has a 1-in. radius. The small sides are used for pressing pulleys from small motors. Because of the thick steel that was used, these plates measuring 8 in. by 12 in. overall, withstand heavy pressure when bridged across wide supporting spans. This equipment is used by the Chautauqua Electric Motor and Repair Corporation, Jamestown, N. Y.

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Code Chats . . . . .

Questions and answers relating to the interpretation of the National Electrical Code . . .

Conducted by F. N. M. Squires

Chief Inspector New York Board of Fire Underwriters

Cords for Refrigerators

What would be considered permissible lengths of reinforced cord in connection with electric refrigerators?

There is no set length of cord mentioned in the Code. A common sense interpretation of the rule must be made. Generally 6 to 8 ft. is considered sufficient. There is little excuse for not having the receptacle for a refrigerator placed quite near the refrigerator while it is not always possible with other appliances.

Wire Connectors

Can solderless connectors be used in a 3-in. box (junction box) or are they only for use in fixture canopies?

Solderless connectors are listed as approved by Underwriters' Laboratories under the heading, "Wire Connectors." Their use is not limited to fixture work and they may also be used for splicing wires in junction boxes or elsewhere provided the proper type for the particular use and size wires is selected.

Separate Ground for Yard Buildings

Is it required to ground each lighting feed at each building under the following conditions:

Thirteen buildings, each wired for 560 watts, knob and tube, 2-wire circuits, service 110 V., a.c. There is one driven ground at transformer at pole. One building has water piping in easy reach.

It is assumed that the thirteen buildings constitute a group under single ownership and served through one meter.

A separate ground at each building is not required but besides the ground at the transformer, there should be a ground at the point where the group of buildings is serviced. This will probably be where the meter is located and if the water pipe is available at this point the ground connection should be made to it.

Size of Feeder When Using a Double Throw Switch

I am wiring a dwelling for two electric ranges. One will be in the basement and the other in the kitchen. It is not intended to use both at the same time. May I install a double throw switch and then have my feed sufficient to take care of but one range, or must I provide feeder capacity for two ranges?

As the double throw switch precludes the use of more than one of the ranges at a time the feeder could have a capacity of but one.

If one range is larger than the other, the larger one would govern the size of the feeder.

BUSY BROTHERS: Large Boston and state projects have kept the Quinn brothers busy for several years. These jobs included the new Sumner vehicular tunnel to East Boston; Suffolk Downs race track, said to be America's most modern plant; Worcester State Hospital; Taunton, Mass. Dog Racing Track; several new buildings at the Boston City Hospital and numerous Boston police and fire stations. James F. Quinn, (left) and brother George J., were examining the drawings for the advance construction program at the Passamaquoddy, Maine, tide-water power generating project when photographed, while a third brother J. Walter Quinn, was out on some of their jobs.

Show Case Wiring

In show case wiring, such as for the display of coats and dresses, is it necessary to use fixtures with concealed wiring only? Also is it in violation of the National Electrical Code to have bare bulbs in such a case?

Probably most Inspectors would place a violation on the use of externally wired chain fixtures in a show case because of the liability of the window dresser sticking pins in the insulation. However, there is no direct Code rule on this.

As to the use of bare bulbs in such cases reference is made to rule 1504-b which prohibits gas-filled lamps being located where liable to contact with flammable material, unless installed in approved fixtures.

Fusing Old Non-Polarized Circuits

Would you not consider it mandatory to double fuse old non-polarized installations when changes are made to the system, the circuits remaining intact—2 black wires, for instance changing the panel in a theatre?

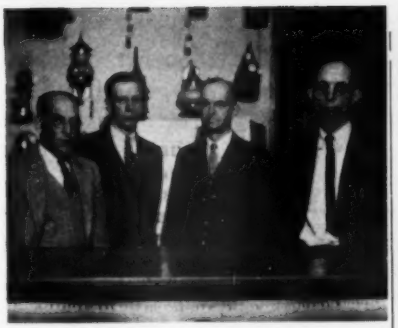
Unless complete identification of the grounded conductors and polarization of all sockets can be accomplished, the old circuits should have all wires fused. Identification can be accomplished by tracing, testing and then painting or marking the grounded conductors. Then it is easy to polarize the sockets.

New circuits, however, which can be installed with complete polarization can be single fused.

Hazards of Neon Transformers

In the August issue of this column comment was made in answer to an inquiry relative to the personal hazards involved through contact with the neon sign type of transformers.

The reply indicated that approximately 150 milli-amp. at 15,000 volts would not necessarily be fatal. The observations given were based upon reports given some time back by neon sign workers, who reported substantially as given in the August Chat. However, we probably should have said that they reported regarding currents from transformers of the ratings of 50, 75 or 150 milliamp., than to speak of currents of those densities. When they were in



A SUCCESSFUL PARTNERSHIP: It was twenty-three years ago that these four men decided to start an electrical contracting business in Jamestown, N. Y. They are all still active in the Linquest Electric Company, having incorporated the firm in 1915 with O. B. Linquest, (right) as president; his brother, Walter L. as vice-president; H. M. Lund as secretary; and F. J. Sutton, (extreme left) as treasurer. Their local high school wiring contract will amount to nearly $90,000, while several large local industries that are modernizing their equipment have left the electrical worries to this busy quartet. Large retail sales and display rooms are maintained in this company's quarters.

contact with the current of, say, a 75 milli-amp. transformer they had no knowledge as to how much current was flowing and therefore their reports should not be regarded as conclusive.

One of our readers has written regarding the August article and reports that in one test in which he took part 15 milli-amp. at 35 volts was all that was bearable and even that was far from comfortable. He suggests that we seek the opinion of some authorities who have made studies of the effect of electricity on the human body, which we will gladly do and report to our readers at some future time.

Short Time, Intermittent, Periodic and Varying Duty

Relative to 809-a kindly give me a definition of short-time, intermittent, periodic and varying duty, as defined in the A.I.E.E. standards.

The A.I.E.E. definitions are as follows:—

Short-Time Duty: Short-time duty is a requirement of service that demands operation at a substantially constant load for a short and definitely specified time.

Intermittent Duty: Intermittent duty is a requirement of service that demands operation for alternate periods of (1) load and no load; or (2) load and rest; or (3) load, no load and rest.

Periodic Duty: Periodic duty is a type of intermittent duty in which the load conditions are regularly recurrent.

Varying Duty: Varying duty is a requirement of service that demands operation at loads, and for periods of time, both of which may be subject to wide variation.

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ELECTRICAL CONTRACTING

S. B. WILLIAMS, Editor

More Inspectors

DURING the last two or three years the country has been seriously undermanned in municipal electrical inspection departments. City after city in setting up its budget has pared down the expenses of inspection, sometimes on the ground of general economy, and sometimes on the ground of insufficient revenue from fees and permits.

In spite of the fact that new construction was down, there was plenty of work for all the inspectors. Bootlegging undoubtedly grew to very large proportions, simply because there were not enough inspectors to adequately handle the situation.

Now that new construction is again on the increase, with new homes estimated for a 50 per cent or greater increase in 1936, it is apparent that our inspection forces must be strengthened at once.

Electrical contractors pay a license fee for the privilege of doing business, and a fee for inspection. This involves an obligation on the part of the municipality to provide protection against competition from non-licensed contractors as well as an obligation to provide prompt and efficient inspection so that the contractor will not have to wait for his final payment.

During the depression, the contractors were sympathetic with the economy program at the city halls, but now, with construction becoming more active, they feel that the need for economy is over, particularly where inspection departments are self-supporting.

Unless the inspection fees are increased, the contractors are either going to find that the inspection is superficial and grossly inadequate, or else they are going to be delayed in securing their certificates. Inadequate inspection opens the gate to competition of the worst sort. besides permitting dangerous wiring to get by. Delay in inspection ties up the contractor's working capital, and thereby curtails his opportunity to take on more work.

As the budgets for 1936 are made up, contractors are urged to put pressure on their inspection departments and their city fathers to secure more money for the department. The contractors should insist that the money they pay into the city treasury be used entirely for inspection. When it goes into the general fund, it becomes in reality an occupational tax. Legally, however, these fees are not a tax but are the cost of assuring the public that electrical work will be done by competent people and safely.

It is the moral and legal obligation of every city to provide adequate electrical inspection, at least up to the amount of fees received for such work.

Apprentices

A SUGGESTION comes from Canada that one way to lick the apprenticeship situation is for the government to apprentice young men on relief out to contractors, with the government paying part of the apprentice's wages. While such an idea will not appeal to American business men, because it involves too much government in business, it is the sort of thing that might easily be promoted if contractors and other employers do not find a solution first. Training of apprentices should begin now. It is imperative that some constructive attention be given to this problem by the industry.

Differentials

IN setting up its program for securing adequate differential for electrical contractors, the N. E. C. A. committee on distribution makes it apparent that such differentials belong only to contractors who earn them by virtue of services performed. The committee states these services to be creative selling, engineering, guaranteeing operation, supervising operation and servicing of equipment.

No one can question the fact that such services demand compensation but the question that will linger in the minds of the manufacturers is whether or not the contractor can perform such

services. If the contractor receives an adequate differential, will he use it for these services or will he use it as a tool in competitive price cutting?

The committee, of course, is very much aware of these questions, and for that reason is approaching its work from the standpoint of first trying to get the contractor to put his house in order. The committee in other words, has no intention of approaching the manufacturers until the contractors in sufficient numbers have demonstrated their seriousness in wanting to earn this differential.

This will involve organization and obligations. Those who are willing to perform the services necessary to get it, must be prepared to protect the program against the onslaughts of chiselers, and the demands of contractors who are not willing to perform the necessary services.

Of course, all of the obligation does not fall upon the contractor. If he is to perform satisfactorily, he must not be expected to live merely on the skimmed milk. In other words, the manufacturers and wholesalers need not expect the contractor to be satisfied if they try to eliminate him from the cream of the business. The contractor must have ample sales opportunity, and not be handicapped by by-passing. Here is another reason for strong contractor organizations.

The plan, in other words, boils down to integrity of purpose, square shooting, cooperation on all sides and strong organization.

—◇—

Farm Line Labor

BIDS are now being requested for the construction of several farm lines which have been approved for financing by R.E.A. Under the Act, R.E.A.-financed lines must be erected with relief labor. It would be well, therefore, for contractors to be hesitant about placing bids or accepting contracts for such work until some understanding has been had with regard to labor supply and management.

Much of the work will, of course, be common labor, and there should be no difficulty in finding enough such labor. In the skilled labor class it might be different. The important thing, however, is not so much the supply as the control of labor.

Since these men are on relief will they give an adequate amount of work? Can they be discharged?

If the contractor cannot be "boss" on these jobs, he better not take the contract. Let Uncle Sam pay the relief—he is much better able to than the contractor.

—◇—

Bare Neutral

LAST spring the Electrical Committee, N. F. P. A., voted bare neutral down as an interior wiring system and then "as a gesture to the utility interests," as one member put it, voted to permit the use of bare neutral for range wiring. At the time we took exception to that kind of action on the part of the Electrical Committee, on the grounds that there could be no compromise on bare neutral as an interior wiring system. Either it should be permitted or it should not be permitted.

If anyone thought that by allowing bare neutral for range wiring its proponents would be satisfied, let him read in this issue the paper on farm wiring that was presented by Morris H. Lloyd, rural service engineer, Buffalo, Niagara and Eastern Power Corporation, before a meeting of North Atlantic Section, American Society of Agricultural Engineers, Ithaca, N. Y. There one will find the statement: "If an uninsulated or bare neutral is approved for a range circuit, it would seem logical that it would be equally safe and satisfactory for other purposes."

From the standpoint of the proponents of bare neutral, the logic of this statement is unassailable. From the standpoint of the electrical industry as a whole, however, such a statement can have some rather serious repercussions.

The water works industry was not fooling when it opposed bare neutral. It came close to blocking approval of the 1935 Code as an American Standard. The water works industry is not going to be patient forever. Unless the electrical industry in some satisfactory manner can assure it that bare neutral is out, we may just as well face the fact that water pipe grounds will be taboo.

Of course, water pipe grounds are not necessary. It is possible for a power company to provide a common customer ground instead. We wonder, however, if this is good economics from the standpoint of the power group? Is bare neutral worth the price of installing a common customer ground?

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N.E.C.A. News..

Material for this department is supplied by the headquarters staff of the

National Electrical Contractors Association

420 Lexington Avenue, New York, N. Y.

President	Vice President	General Manager
E. N. Peak	Louis Kalischer	Laurence W. Davis
1603 West Main St.	17 Bergen St.	420 Lexington Avenue
Marshalltown, Ia.	Brooklyn, N. Y.	New York, N. Y.

Comprehensive Wage Rate Survey

The most complete and authoritative wage rate survey yet made by the Association will be mailed out to the membership early in December. It covers both union and non-union wages, where they prevail, for journeymen and helpers in 972 cities and towns, which is almost twice the number in the previous survey.

N.E.C.A. Invites Electrical Industry Conference

At the invitation of President Earl N. Peak a conference of major industry executives from each of the four national electrical industry associations will be held in New York on December 12. In extending this invitation, Mr. Peak stated that he feels that the electrical industry is today facing its greatest need for a united sales program which can succeed only through team-work and mutual understanding between manufacturers, wholesalers, contractors and utilities.

With this objective he has arranged for this electrical industry conference to secure an exchange of industry thinking and a closer understanding of the plans and programs of the four national associations, and for the formulation of a broad industry policy and coordination of their efforts.

Social Security Tax Bulletin

The N.E.C.A. has prepared and distributed to all of its members an eight-page Tax Bulletin containing an analysis of the Federal Social Security Act and state unemployment insurance acts thereunder.

Under the Federal Social Security Act employers are faced with three separate items of responsibility of their own and an additional one on behalf of each employee. The federal old-age benefit tax will affect every employer of one or more employees, and the federal unemployment insurance tax and state unemployment insurance tax will apply to employers who employ varying numbers of employees from one up to eight and over.

This first Tax Bulletin covers all of the essential phases of the Act which employers need to know immediately and includes a complete outline of the necessary employment and payroll records and forms which will be required after Jan. 1, 1936. This bulletin will be followed by additional bulletins covering other phases of the law and members will be kept informed regarding all further developments and interpretations under the Social Security Act.

Out of Construction League

The N.E.C.A. has resigned from the Construction League of the United States.

Executive Committee to Meet

A meeting of the Executive Committee will be held at the national headquarters in New York on December 11, 12 and 13. At this meeting plans will be formulated for further enlarging the constructive program announced by President Peak immediately following the convention.

The Committees on Distribution, Highway Crossings Signals and Rural Electrification have made substantial progress in the past two months and action will be taken upon their recommendations for further development of profitable business through these channels.

The Executive Committee will also act upon recommendations for the appointment of further committee assignments. It is announced that each committee to be designated will have under the chairman of such committee, appointees to serve from the Association membership throughout the country so that the experience and viewpoint of all sections of the industry may be enlisted in the N.E.C.A.'s program for the coming year.

To Attend Berry's Meeting

At the Industrial Conference, called by George L. Berry, coordinator for industrial cooperation, for December 9 in Washington, N.E.C.A. will be represented by President Peak and General Manager Davis.

Distribution Committee's Objectives

The N.E.C.A. Committee on Distribution under the chairmanship of Ralph M. Walker has issued the following statement to the electrical contracting industry:

"Your committee has given much study to the steps which must be taken to reach our objective in placing the business of electrical contractors upon a more profitable basis. We have had first to try to reduce the statement of the problem to its simplest terms.

Industry Policy

"We visualize our objective as the greatest sales program the industry has ever seen. Such program can succeed only through united effort and friendly cooperation between manufacturers, wholesalers, contractors and utilities. The prosperity of one group cannot rest upon the disadvantage of another group. There must be developed an electrical industry policy which will recognize the interests and functions of each branch of the industry and assure the prosperity of all.

"Your Committee on Distribution is already in contact with the other branches of the industry and finds them ready and eager to cooperate in the program which we have announced, when evidence can be presented of such organization within the electrical contracting branch as will indicate the ability of the electrical contractors to do an industry selling job, to create new markets and to prove ourselves the most effective distribution outlet.

"We do not ask nor expect manufacturers or wholesalers to sacrifice any market for their products and services. Our whole program is directed to showing manufacturers and wholesalers that through complete cooperation and team-work the markets can be increased, the consumer better served, and the cost of distribution lowered when industry products are directed through the electrical contractor to the consumer and the contractor receives a profitable compensation for his services.

Contractors' Functions

"Electrical contractors are entitled to receive compensation for distribution functions when they render the following services to the manufacturer and wholesaler:

1. Creating demand for electrical products by salesmanship, contact with consumers and market development;

2. Building good will for and exploiting the products of particular manufacturers by recommending and using such products when installation contracts do not call for parts by trade names;
3. Making no substitutions for specified products where the manufacturer has created a specific demand;
4. Supplying engineering experience in the proper assembling of the diverse products of different manufacturers and combining them into a balanced installation;
5. Guaranteeing the successful operation of the entire installation, including the parts contributed by each manufacturer; and
6. Supervising and servicing the successful operation of the equipment after it is installed, thereby assuring continuing good will for the products.

Differentials

"The electrical contractor is entitled to an adequate differential over the consumer as compensation for these services. We are asking for such compensation only for electrical contractors who perform the services shown above. Our task is to demonstrate through effective organization that we are prepared to protect the industry against the demands of any contractor who expects such compensation without performing these services. On the other hand, an economic balance in distribution can not be attained if either the manufacturer or the wholesaler bypasses the contractor to get the cream of the business and leaves to the electrical contractor only such sales as require the greatest expense and effort to obtain.

Organized Contracting Industry

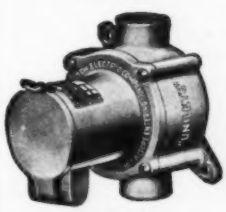
"Our first and immediate problem is to build up local and state associations upon a uniform national plan of organization which will enlist every electrical contractor regardless of size or field of business. If you have a local association in your community today which does not embrace every contractor who is a factor in reaching the consumers, no matter how small that contractor may be, we urge that your first step will be to either open the doors of that local association and bring in fullest possible membership, or cooperate in providing for their organization in the fullest spirit of friendliness and cooperation with your existing local association.

"If you have today a state association that does not embrace every local association within your state, we urge that you take steps to make your state association actually such a state organization of all local groups. If you have no active state association we urge that you contact with all other local groups within your state and call together a conference of their representatives and of the leaders in the communities where there are no local associations for the formation of a strong state body."

INSURE SAFE WIRING IN HAZARDOUS LOCATIONS WITH APPLETON EXPLOSION-PROOF UNILETS

Type "EVA" Explosion-Proof Lighting Fixture (100 and 200-Watt)

Type "HMSC" Explosion-Proof Motor Starter (Local Control)



Type "CPSIC" Unilet Complete with Lift Cover (Closed)

Type "EFSC" Motor Control Push Button Station

MDS Series Explosion-Proof Unilets

The full requirements of the Underwriters' Laboratories are met by Appleton Explosion-Proof Unilets. Actual experience in hazardous locations has shown them to be 100 per cent effective in removing the danger of detonation of explosive gas or dust. They efficiently protect lives and property—*and decrease insurance rates.*

Appleton Explosion-Proof Unilets are made of malleable iron for sturdiness and complete safety. The cadmium finish serves to make them rust resistant—insuring long and satisfactory service.

Bulletin No. 1003 contains essential information for wiring in hazardous locations. It lists the many types of Explosion-Proof Unilets that meet every wiring need. Write for your copy today.

Sold Through Jobbers

APPLETON ELECTRIC COMPANY

1704 Wellington Ave., Chicago, U. S. A.

New York—76 Ninth Avenue
Philadelphia—401 North Broad Street
San Francisco—655 Minna Street
Los Angeles—340 Azusa Street
Detroit—7621 Woodward Avenue
St. Louis—420 Frisco Building

APPLETON
Explosion-Proof
UNILETS

Reg. U.S. Pat. Off.

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Contracting .... News .....

Rewire America Campaign

A program to rewire America as suggested by FHA to the electrical contractors of the country, has been made the subject of a special meeting to be held on December 18, of representatives of all the wiring materials sections of N.E.M.A. This meeting, which is called by the N.E.M.A. business development committee, will consider the feasibility of a nation-wide wiring sales program under the slogan "Rewire America."

Federal Subsidy for Rural Line Construction

Federal support of a long-range comprehensive program to bring electricity to at least half of the farms in the United States is economically and socially justifiable, states Morris L. Cooke, REA administrator, in a letter to Senator George W. Norris of Nebraska. This result could be accomplished in ten years, he estimates, at a cost of about $1,500,000,000 of which at least one-third should eventually be self-supporting.

Mr. Cooke's letter is a reply to a request of the Senator's asking what would be involved in extending power lines to a much larger percentage of rural homes than are now supplied with current, how soon this could be brought about, and whether, in the Administrator's judgment, a subsidy would be justified to put such a program into effect.

Mr. Cooke's reply points out that electric power has become a social necessity and should be available in "any area where costs would not be prohibitive and the prospective use would be sufficiently large."

While some sections of the country cannot be served economically under any conditions, a large portion of it should be accorded the benefit of federal aid, the degree of which should be determined upon the basis of cost per customer. A comprehensive, planned construction program should be followed, aimed at nearly complete coverage of an area without more gaps than can be avoided. Unless lines are placed to serve as many farms as possible at the time of original construction the advantage of minimum construction costs will be lost forever. Providing the rural population with electric power would be to the interest of both rural and urban populations, Mr. Cooke points out, and would truly serve national interest.

San Francisco Construction Industry Code

After many months of negotiation the code of self-government for the construction industry of San Francisco, Calif., has been signed by each separate contracting group and operation of the central bid depository, which had been set up during the NRA Code, resumed.

Operation of the Code shifts the administration of hours, wages and working conditions pertaining to all crafts from the local associations to the Code of Self-Government. Duplicate bids on jobs of $100 or more and on which two or more trades are engaged are filed in the central bid depository. A poster is assigned to each construction job and each craft has a distinctive stamp which is affixed to this poster. These stamps are an indication of compliance with wages and hours set up under the terms of the Code.

Under the provisions of the Code of Self-Government, wages, hours and working conditions which were in force prior to the Code are to be maintained. On matters relating to labor an adjustment board is provided, consisting of four members representing labor and four members representing employers, with the executive manager acting as chairman. A final arbitration board is set up for the settlement of any disputes and the hearing on any changes in wages, hours, working conditions or other provisions of the code. This arbitration board is selected jointly and is made up of three citizens of the community who have no interest, financial or otherwise, directly or indirectly, in the construction industry.

The only fair trade practice rule enforced by the code is that against bid peddling.

By the operation of this code the San Francisco building construction industry hopes to provide a forum for the adjustment of any difficulties or problems between various groups of the industry and prevent disruptions due to labor troubles or intra-industry conflicts.

Charles A. Langlais, former president of the San Francisco Electrical Contractors Association, is representing the electrical contractors on the adjustment board.

LEAGUE PRESIDENT: George W. Patterson, newly elected Eastern Canadian Executive Committeeman, N.E.C.A., is president of the Electric Service League of Toronto, the League which originated "Red Seal" wiring. Incidentally he is the first contractor to be president of the league.

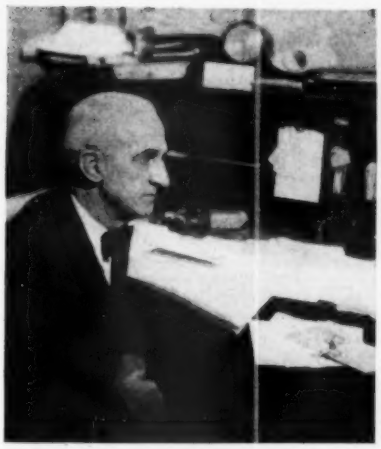
To Revise Adequate Wiring Manual

Through its uniform legislation department, N.E.M.A. is revising the Manual of Adequate Wiring, in order to make it adaptable to local conditions. It will be made available by January 1 for any local group that wants it on a basis for promoting adequate wiring. In making this revised manual available for local sponsorship, N.E.M.A. insists that it is not to be considered in competition with any other manual on adequate wiring.

Social Security Taxes

Under the terms of the Social Security Act, passed this summer by Congress, electrical contractors who employ eight or more persons for at least one day a week during twenty different weeks in a year, must pay a tax of 1 per cent of that payroll during 1936, 2 per cent in 1937, and 3 per cent thereafter. This tax will be for unemployment relief. This is the first of the taxes under the Act, the tax for old age pensions not taking effect until the following year. This present unemployment tax is paid entirely by the employer.

If one is employing people in a state with unemployment relief laws ap-



OLD ACCOUNTS ACTIVE: A spirit of optimism prevails around the offices of the Whiffen Electric Co., Inc., of White Plains, N. Y., these days, because Walter W. Whiffen notices an upturn in business. Old accounts which were inactive for several years are returning to the fold once more, says Mr. Whiffen, who has been operating at White Plains for twenty-six years. A $60,000 wiring contract for the new county home for the aged is now being done by this company.

proved by the Federal Social Security Board, he may deduct from his federal tax that which he pays to the state as unemployment relief tax, to the extent of 90 per cent of the federal tax. If there is no approved state law, the entire tax goes to the federal government instead of being employed in the state for unemployment compensation.

A complete analysis of the Act, as well as existing state laws, has been made by the National Electrical Contractors Association. A survey of the records to be kept is also made.

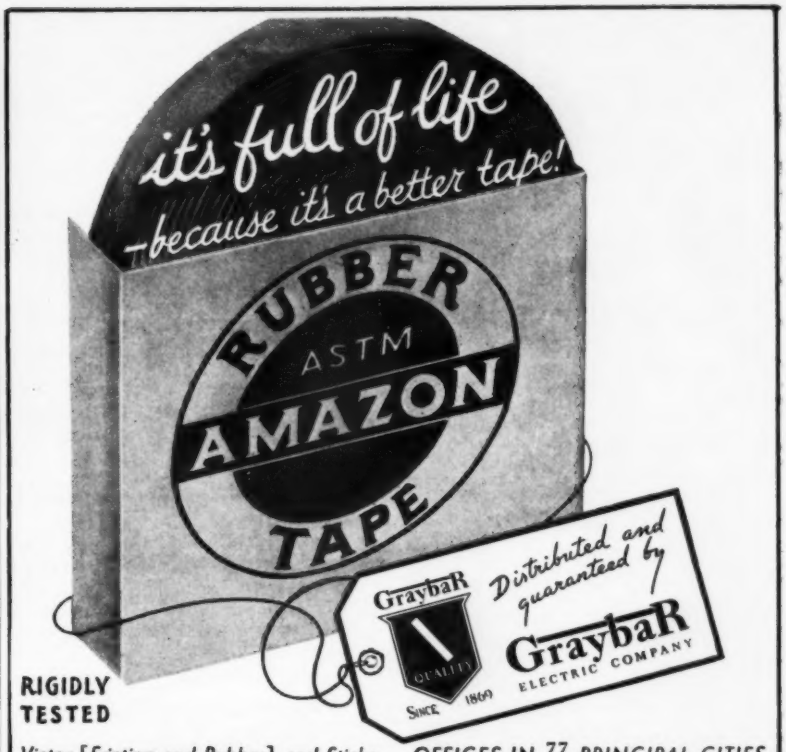
Because of the possibility of coming within the scope of the Act at any time, it would seem advisable for all electrical contractors employing labor to keep a careful record of that employment starting January 1.

Northern California Officers

Charles A. Langlais has been elected president of the Northern California Chapter, N.E.C.A.; J. Del O'Connor, Sacramento, first vice-president; Louis Douat, San Francisco, second vice-president; Ed Martin, San Francisco, secretary-treasurer. District executive committeemen elected were George Draeger, George Foss, Les Polland, and H. H. Courtright.

Frank Hall

Frank W. Hall, vice-chairman of the executive committee of the Merchandise Department of the General Electric Company, died at his home in Shippan Point, Conn., on November 25. Mr. Hall started in the electrical business in 1895, with the Sprague Electrical Company with which, except for four years, he was constantly identified, be-



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Single Utility Outlet

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Watertight Floor Outlet

Build up prestige and good will by installing quality materials in all your jobs.

STEEL CITY PRODUCTS

help the electrical contractor gain a reputation, not only for furnishing quality products but workmanship as well, because they are manufactured in accordance with the workman's needs, insuring speedy, dependable performance at all times.

We manufacture a complete line of outlet boxes, covers, switch boxes, conduit fittings and electrical specialties, furnished in sherardized, galvanized, enameled or cadmium finish.

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PITTSBURGH, PENNA.

Gentlemen:

Please send a copy of your new catalogue to

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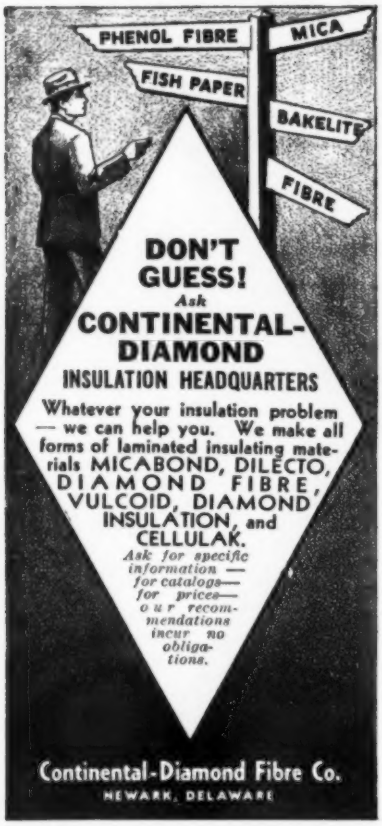
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DON'T GUESS!
Ask
CONTINENTAL-DIAMOND
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Whatever your insulation problem — we can help you. We make all forms of laminated insulating materials MICABOND, DILECTO, DIAMOND FIBRE, VULCOID, DIAMOND INSULATION, and CELLULAK.
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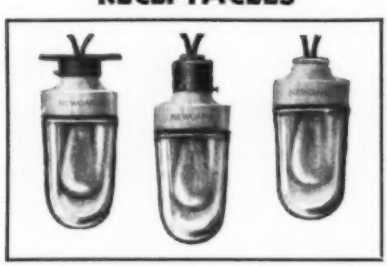
MULTI BUSHINGS

The most practical and approved means for protecting conductors when passing through metal. Multi Bushings are made in several styles to suit all requirements. Will lock securely in place and cannot be loosened by vibration. Be sure to install Multi Bushings for all around satisfaction.

MULTI WEATHERPROOF RECEPTACLES



Vapor and Weatherproof Lamp receptacles that effectively seal the metal parts and lamp against moisture or corroding gases. Made in styles for open wire, for suspension from conduit or on outlet boxes and in sizes for lamps to 60 watts and to 150 watts. A thoroughly satisfactory fixture approach by Underwriters.

WRITE FOR COMPLETE CATALOG

MULTI ELECTRICAL MFG. CO.

1840 W. 14th ST., CHICAGO, ILL.

ing commercial manager at the time of its merger with General Electric in 1922. He handled commodity sales at Bridgeport until the next year, when he became sales manager in charge of construction materials. Two years ago he was advanced to the position he occupied at the time of his death.

A Roll o' Tape

Electrical Flashes gathered among the big wire and pipe men

by
Electrical Contracting's Field Editors

The Duvall Electric Co. has two places of business in Albany, N. Y., the main office, display and sales rooms being on busy Hudson Avenue, while its motor service shop is located in a loft building on a nearby street where rents are not so high.

IN recently moving to new office quarters, the firm of Doster & Egan of Syracuse, N. Y., retained a separate warehouse for tools and minor material items. By supervising the orders for material closely, each job takes care of itself, especially because of the majority being out-of-town projects.

Joseph D. Quinn waited two years for a testimonial letter regarding a $50,000 industrial plant wiring job at Poughkeepsie, N. Y. When he got it from a prominent consulting engineer, it proclaimed his fine workmanship and the fact that after two years' service no trouble or defects had developed.

TAKING the shop to the customer's desk is a highly specialized procedure with the sales staff of Berger Bros. Electric Motors, Inc., Rochester, N. Y. Their presentation procedure is organized to emphasize this company's facilities in logical sequence, involving the use of twenty-nine 8 by 11-in. photographs of the plant. These are made up in sets, with durable linen backs and rounded corners, to fit loosely in a leather carrying case. Busy executives are said to enjoy an over-the-desk tour of a modern service shop and its production methods. The loose-leaf photo idea proves its merit in selling groups, because it is found that certain persons want to examine certain views more closely than others, and can do so without slowing up the proceedings.

The Barnum Bros Co., of Troy, N. Y., is in its fifty-second year, and a surviving founder, F. W. Barnum is now eighty-six. Until suffering a severe injury this spring, Mr. Barnum continued his regular hours at the office.

IT is advisable for the smaller motor service shops to do "batch" impregnating rather than to maintain a tank of varnish at all times, believes Francis Pautz of Elmira, N. Y. Separate one-gallon cans of varnish are stocked and used as needed for the size of equipment requiring a varnish dip, and the surplus is drained back into containers, leaving any sediment in the vat for removal each time.

When junk copper prices skidded down to 1½ cents per pound Mather-Evans & Diehl Co., Inc., of Utica, N. Y. obtained a baler and stored bales of copper away. When it began soaring, those bales of copper meant a profit of 400 per cent against the baler investment.

A valuable set of small tools in the P & B Electric Co. shop at Troy, N. Y., consists of graded sizes of expansion reamers. These are found necessary in reaming new motor bushings which are found to fit too tightly on the shaft after being pressed into the motor end frames. Quick and accurate reaming can be done rather than resorting to a lathe boring job.

HOMAN and Hill of Chicago, Ill., solved their night-time emergency motor repair service problems by keeping a night watchman on duty in the plant. A little training has made of him an efficient dispatcher of mechanics during the wee hours. Of course, all of the customers have been advised that this company can render them a twenty-four-hour service by merely telephoning headquarters at any hour.

WIRING the world's largest office structure, a claim that is made for New York's 70-story R.C.A. building, resulted in the preparation of what is probably the industry's record job picture story among electrical contractors. J. Livingston & Co. spent over $200 per set for a quantity of handsomely bound books which tell their electrical story.

YOU NEVER SAW A BENDER BEND LIKE THE

BLYTHE BENDER BENDS

The most practical and up-to-the-minute method of bending conduit and tube. 6 Separate Bends on ½ and ¾" Conduit and Tube. Accurate and Uniform. Portable—No Mounting. Speedy. Light Weight. Low priced. Will last a life time. *Write for details.*

HARRY BLYTHE
1550 Lafayette Ave., Denver Colo.

CONEX BAKELITE CONNECTOR

CONEX leads the field because it offers more without additional cost.

SIMPLEX PORCELAIN CONNECTOR

America's first and foremost porcelain connector. Two handy sizes. Write for samples.

WEISS & BIHELLER MERCHANDISE CORP.
584 BROADWAY NEW YORK, N. Y.

Specializing in

ALL THREAD CONDUIT

Made from Enameled Conduit. Standard sizes in stock—special to order.

GALVANIZED CONDUIT REDUCER

A very useful fitting. All sizes from 4x3½ to ½x¼ in.

Write for complete details and prices.

• GWILLIAM •
Manufacturing & Supply Corp.
4417 North Sixth St., Philadelphia, Pa.

"Standardize on
STANDARD
Transformers"

•

ALL TYPES
Indoor and Outdoor Service

•

Send for Descriptive Bulletin

•

STANDARD TRANSFORMER CO.
Warren - - - - - - Ohio

There are 132 pages on heavy stock, nearly all of them illustrated and captioned to point out the important features of this system. According to Mr. Livingston this presentation has already proven its worth in negotiating important contracts where the buyer's inclination toward lower prices stood in the way.

A ROUGHING-IN job by the Arc Electrical Construction Co., Inc., New York, N. Y., for the picture booth of a new movie palace at Times Square required the setting of forty-seven square outlet boxes in less than 25 ft. of wall space in front of three projectors. The hollow tile wall soon lost its hollowness because the many conduit runs required knocking away the inner half of almost all the tile blocks.

The young man's viewpoint in residence fixture sales meets with the hearty approval of H. G. Hatfield, of Utica, N. Y. His son Henry is making good sales away from the office display room to his prospects by showing only selected samples that suit the house.

A general anti-bootlegging order was issued two years ago to all city employees by officials of Albany, N. Y., which is reported to have been very helpful to licensed contractors. A considerable amount of electrical work which had been done during spare time by engineers, maintenance men, firemen, and other city employees was effected by this order.

INDUSTRIAL work frequently involves puzzling situations which require considerable experimenting in the causes of static charges, electrolysis and bacterial erosion. By becoming intimately acquainted with such phenomena in breweries, printing and textile plants, R. L. Alger, electrical engineer for Wipperman and Mitchell, Inc., of Buffalo, N. Y., has made some profitable business contacts.

AFTER submitting a bid for wiring a 150-year-old stone residence, with approximately one hundred outlets, J. E. Hoffman, of High Bridge, N. J., was notified by the owner that outlets were worth "somewhere between fifty and seventy-five cents per outlet." The sad part of it is that the public would have no such ideas as to prices, without some justification.

FOLLOWING the peak years of changeovers from 25 to 60 cycle equipment in and around Jamestown, N. Y., the Chautauqua Electric Motor and Repair Corp. owned a top-heavy motor service plant and found its general overhead out of keeping with a normal flow of business. Arthur E.

More than

1100 TYPES

and sizes of "ELECTROLETS" Killark conduit fittings; also 12 warehouse stocks for the convenience of recognized jobbers and their contractor customers.

The above figure includes SERVICE ENTRANCE FITTINGS, CONDUIT BODIES, FLUSH SWITCH FITTINGS, VAPORPROOF and EXPLOSION PROOF FITTINGS. These are some of the reasons why Killark—BETTER made, EASIER used—"ELECTROLETS" enjoy wide acceptance.

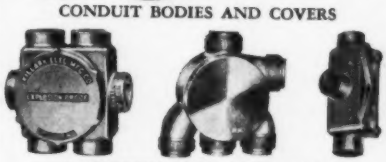
SERVICE ENTRANCE FITTINGS

VAPORPROOF FITTINGS

VAPORPROOF HANDLAMP

GOOSENECK AND FLANGES

CONDUIT BODIES AND COVERS



EXPLOSION PROOF FITTINGS

FLUSH SWITCH FITTINGS

ROUND FITTINGS

SMALL SIZE FITTINGS (TYPE E-Z)

Made of malleable iron, cadmium plated, in all usual types required by electrical contractors. Fittings for threaded and threadless standard conduit and for thinwall conduit.

Manufactured by

KILLARK ELEC. MFG. CO., St. Louis, Mo.

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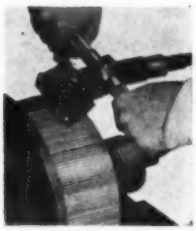
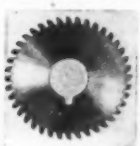
UNIVERSAL POWER MICA UNDERCUTTER



Undercuts large or small commutators without dismantling riggings or removing a single brush. Also, for shop use, as illustrated. Smallest, most powerful undercutter made—works in close quarters—portable. *Write for free trial offer.*

"Long-Life"

CIRCULAR SAWS & CUTTERS



Speed cutting, long life, moderate first cost. Types and sizes to fit all undercutters.

Ideal Commutator Dresser Co.

1041 Park Ave. Sycamore, Ill.

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Cable or Conduit Hanger

Jiffy Clip

Now furnished in EVERDUR as well as Cadmium Plated Steel.

Cable or Conduit Hanger
Rigid Conduit—3/8"—2½"
Thin Wall—½"—1½"

Jiffy Clip—Rigid Conduit
⅛"—1¼". Also B X Cable

Ask your Jobber

MINERALLAC ELECTRIC CO.
25 No. Peoria Street, Chicago, Ill.

New York City Branch
381 Fourth Avenue

Westburgh announces proudly that he has re-arranged the machinery into much less floor space, simplified his routine and office expenses accordingly; but not without months of planning and "weaning" away from large-shop habits.

THE offices of the Stearns Electrical Construction Corp. in Albany, N. Y., resemble the display room of a traffic control equipment agent because this company makes all such installations for the city of Albany. Spare traffic standards, suspension units and timer mechanisms are kept on hand.

ELECTRICAL history—the Henzel Electric Co. recently rewired the old Academy building at Albany, N. Y., during its remodeling. This was where Professor Joseph Henry taught and conducted experiments in self-induction that caused his name to be applied to the present-day term "henry" for the unit of strength of induced currents.

IN laying out the stock-bins in the larger quarters now occupied by the Ford Electric Company, of Washington, D. C., each section or aisle was marked alphabetically. The different types of material are thus kept in their proper alphabetical position, and considerable time is said to be saved in locating the items required to fill large requisitions. This is especially helpful to employees who are new or who do not obtain materials frequently.

THE Bigby Electric Company, Inc., of Tampa, Fla., wants its customers to know the facts about Florida, and in acquiring this knowledge to learn the facts about Bigby service. A 16-page booklet containing 131 questions and answers about the state, and some additional "Do You Knows" about the company is distributed for this purpose.

AN interesting industrial job is now being installed at Rome, N. Y., by Langdon & Hughes Construction Co., of Utica. A copper products plant has provided a tunnel beneath sixteen large electrical furnaces. New transformers, capacitors, bus bar feeders and modern controls are being installed in this space to replace cumbersome old wiring and controls.

"YOU must circulate to get business," states C. P. Wachtel, vice-president of the Ferguson Electric Construction Co., Buffalo, N. Y. This statement is well proven because this company has had a peak crew of 20 men employed since starting in business Aug. 1, 1935. Outside of mailing a neat announcement card to a selected list of industrials, no other promotional expense was incurred, except—lots of shoe leather, gasoline, and rubber tires.

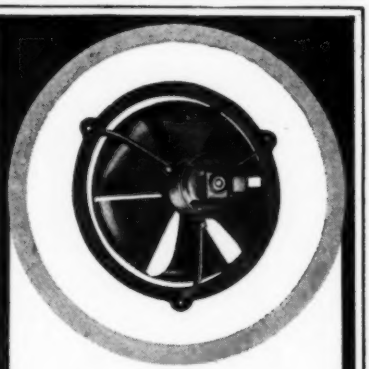
The Badger

50 Amp.

SYNCHRONOUS TIME SWITCH

A thoroughly reliable, high quality time switch that will give many years of dependable service.
The result of over 26 years of exclusive time switch manufacture, this product offers the latest in design and construction.
Approved by the Underwriters' Laboratories and fully guaranteed by the manufacturer.
See your wholesaler or write for complete descriptive literature.

RELIANCE AUTOMATIC LIGHTING CO.
1937 Mead St. Racine, Wis.



Ventilating Fans

If you are not installing Signal Vent Fans, investigate this popular line at once. The reason? Guaranteed quality at prices that return you a satisfactory profit. Here's a complete line that's easy to sell and stays sold. Bucket Blade and Flat Blade Fans. Automatic Shutters, Switches and kitchen fans, adjustable or built-in types. If your jobber cannot supply you write us.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.

OFFICES IN PRINCIPAL CITIES

SIGNAL

New Products . for December . .

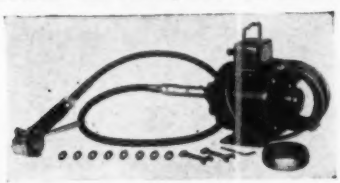
Outdoor Photoelectric Control

The CR 7505-H6 "Novalux" photoelectric relay for controlling outdoor lighting is said to be adjustable to turn on or turn off at any daylight intensity between 0.1 and 10 f.c. Independent "on" and "off" adjustments can be set to switch off at a lower intensity in the morning than that at which it turns on in the evening. Two

phototubes are used to provide this extended sensitivity range, also two potentiometers, and a time switch for transferring control from one potentiometer to the other at approximately noon and midnight. It is also possible to set it up for part-night operations. The steel enclosing case for this self-contained unit has brackets for pole or wall mounting. Various settings may be made by hand without tools, and are easily accessible. The main contactor has leads brought out from both normally open and normally closed contacts to permit the use of various types of magnetic switches or street lighting controllers. Nominal rating 115 volts, but suitable for operation on circuits of between 95 and 125 volts. General Electric Co., Schenectady, N. Y.

Mica Undercutter

The Universal undercutter is designed to cut to within ¼ in. of commutator bar risers, and can be used



in 2¾-in. spaces without removing brush riggings. This tool is electrically driven through a flexible shaft, and has a micrometer depth gauge. It is claimed to be the most powerful, smallest and lightest undercutter made. Saw spindle unit includes a motor specially fitted with a ball bearing shaft connection, over current circuit breaker, 10 ft. heavy duty rubber covered cord, undercutter head, shaft, wrenches, and a choice of milling cutters or steel saws. Ideal Commutator Dresser Co., Syracuse, Ill.

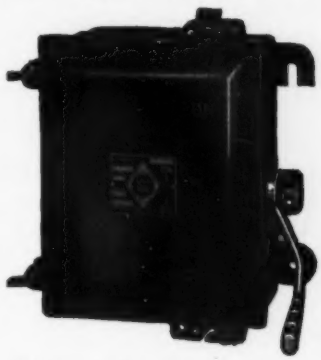
Rural Line Transformers

Available in 1-k.v.a. and 3-k.v.a. sizes for single-phase connections to three-phase, four-wire "Y" systems with grounded neutral. One high voltage phase connection bushing is provided in the cover, the neutral and ground connection being in common with the transformer case. Features of design, which are claimed to meet the need for reduced farm line costs, are: Removable stud bushings for primary and secondary leads; simple mounting brackets for bolting the transformer to the pole or crossarm; primary and secondary surge protecting gaps; ad-

justable cover for easily rotating the secondary bushings with reference to a pole or secondary rack; and easily removable or tightened cover clamps. These transformers are designed for 2400, 4800, 7200 and 7620-V. to operate on "Y" voltages of 4160, 8320, 12470, and 13200 V. respectively, and with 120/240-V. (3-wire) secondaries, or 2-wire service only. Kuhlman Electric Co., Bay City, Mich.

Weatherproof Type "A" Switch

Weatherproof cast iron cabinets are now available for the "Dualbreak" line of type "A" safety switches. These are designed for use where excessive moisture, dust, lint or corrosive agents may be present, such as in cement, flour and paper mills; breweries, chemical and woodworking plants; grain elevators, dairies, and other applications. Rugged construction features are claimed, including non-corroding eye-bolts and wing nuts for the rubber-gasketted cover; a dust-tight operating handle which is interlocked with the cover, and which may be padlocked in the "off" position; and a durable quick-make and quick-break



switching mechanism. Available in ratings up to 50 h.p. in fused or non-fused types. Colt's Patent Fire Arms Mfg. Co., Hartford, Conn.

Elevator Control Cable

A line of Deltabeston fireproof elevator control cable which can be had in assemblies comprising up to and including thirty-seven conductors. This product is offered as an added means of fire prevention in electric elevator operations. It is said to resist flame, heat, moisture, oil and corrosive vapors. The individual stranded copper conductors are insulated with flame-resisting and water-proof rubber, a wall of felted asbestos, and a layer of rayon braid. These individual conductors are then cabled together with asbestos fillers, and bound with rubberized tape, over which a final asbestos yarn braid is applied which is saturated with a flame-proof and moisture-resisting compound. General Electric Co., Merchandise Dept., Bridgeport, Conn.

Heater Cords

"Long-Wear" replacement heater cords are furnished of special No. 18 twined braid cord in 7-ft. lengths. An unbreakable soft rubber plug is per-

manently attached at the factory, while the opposite end is finished ready for attachment to the heating appliance terminals. Belden Manufacturing Co., Chicago, Ill.

Intercommunicating Telephones

Serv-U-Fones may be used for common-talking and common-ringing systems comprising from three to ten desk or wall type stations. Signaling is accomplished by depressing the

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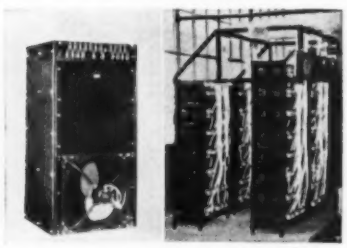
cradle upon which the "french" type hand-unit rests. This signaling method is suggested for paging purposes be-

cause the signals of all stations are sounded simultaneously. A buzzer is concealed within the desk type unit and a bell is concealed in the wall type. This system employs 4-conductor wiring, for which each unit is provided with a terminal strip with solderless connections. An impedance coil is also included. Four to eight dry cell batteries are recommended (depending upon the number of telephones), for which one battery box is supplied. American Automatic Electric Sales Co., Chicago, Ill.

Compact Ready-Wired Resistor

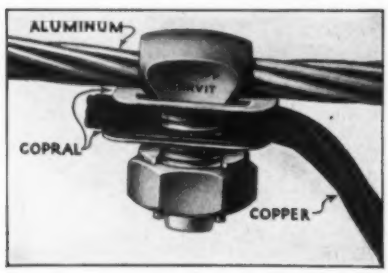
Speed regulating resistors for a.c. wound-rotor motors of 100 h.p. or larger which are mounted in a fan-cooled steel cabinet with all grid connections completed at the factory. A saving in space of from 35 to 50 per cent is said to result from the



reduction of grids because of positive ventilation. The completely assembled units are ready for installation without requiring additional racks or supports thus simplifying assembly and installation costs. Other claims advanced are the elimination of grid breakage, greater mobility and cool operation. General Electric Co., Schenectady, N. Y.

Service Connector

A clamp type "Servit" connector, for joining aluminum and copper line cables, is designed to avoid electrolytic corrosion when these connected metals are exposed



to the atmosphere. Copral bi-metal washers are provided, their copper faces surrounding the copper cable and their aluminum faces being in contact with the aluminum cable. A nut and pressure bar clamps the two cables and the washers in a U-bolt. Only a wrench is claimed to be needed for tightening this connector to withstand vibrations running into millions of cycles. Available for the popular sizes of aluminum and ACSR conductors. Burndy Engineering Co., New York, N. Y.

Outlet Box Circuit Breaker

A line of tamper-proof, trip-free circuit breakers which may be installed in standard flush outlet boxes or in

gang boxes, similar to flush tumbler switches. Rated up to 20 amp., 125 volts, a.c. or d.c., they provide short circuit or overload protection for branch circuits in residences or apartment buildings. Their use is recommended for protecting branch circuits which have been connected to tap or sub-feeders in various parts of a building, in place of bringing several branch circuits to a conventional panelboard unit. These circuit breakers can also be used as a switch control. Their design is claimed to employ sealed-in, rust-proof mechanisms, positive in action, and free from vibration or shock disturbances. General Electric Co., Schenectady, N. Y.

Magnetic Contactor

A line of contactors for mills, crane machinery and other d.c. applications

available in 800-amp. sizes and smaller. Line-Arc contactors are claimed to rupture arcs which are formed as the circuit is opened, by means of arcing guards or plates which are independent of the arc shields. Their mechanical design features the use of strong but light weight, low-inertia moving parts as a means of permitting quick response, and high speed operation, with a considerable increase of contact life resulting. The Electric Controller & Mfg. Co., Cleveland, O.

Neon-Sign Cable

A 15-kilovolt weatherproof neon-sign cable, which has a smaller diameter than the older type, is claimed to provide savings in the time required to wire signs, savings in space, and in the size of glass tubing in window signs. General Electric Co., Schenectady, N. Y.

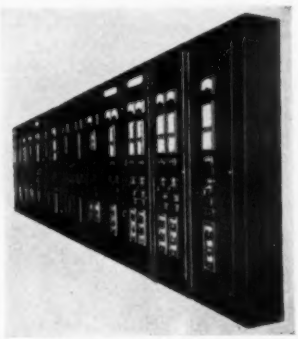
Suspension Primary Cutout

A fuse cutout for rural transmission lines which may be hooked directly to the primary line wire and connected in this suspended position to the transformer primary leads. A fibre-lined bakelite tube contains the fuse assembly which includes standard S&C universal fuse links and a spring cable that is normally under ten-

sion. When a fuse link melts the coil spring collapses and establishes a safe air gap between terminals. Schweitzer & Conrad, Inc., Chicago, Ill.

Smooth-Front Switchboards

By recessing instruments and other devices to project only about an inch from the front of steel switchboard panels a "streamlined" appearance is obtained. This method of semi-flush mounting may be applied to vertical switchboards, benchboards, cubicle doors, metal-clad front enclosures, and swinging brackets to provide a modern appearance in harmony with



smooth walls and machines of modern design. General Electric Co., Schenectady, N. Y.

Trade Notes . .

W. D. Hamerstadt was recently elected president of the Rockwood Manufacturing Co., Indianapolis, Ind. Mr. Hamerstadt entered the Rockwood employ in 1907 and served successively as chief engineer, superintendent and general manager.

J. L. Buchanan, formerly president, has been elected chairman of the board of the General Electric Supply Corp., succeeding Gerard Swope, resigned. J. L. Busey, formerly manager of sales of the appliance sales division of the Merchandise Department of the General Electric Co., has been elected president of the supply corporation.

The Graybar Electric Co. announces the appointment of A. D. Hammond as manager of its Birmingham, Ala., office to succeed W. R. Phillips, who has retired at the end of thirty years of active service. Mr. Hammond has seen twenty-nine years of service, mainly at Atlanta, Ga., except for a period from 1925 to 1928, when he was sales manager of the Miami, Fla., office.

Van Cleef Bros., Chicago, Ill., has appointed W. C. Floyd to have charge of sales on Dutch Brand products in the states of North Carolina, South Carolina, Georgia, Florida, and Virginia. George Bills, who formerly covered this territory, will now devote his full time to the states of Tennessee, Alabama, Mississippi, Kentucky, and parts of Indiana, Florida, and Illinois.

The Killark Electric Mfg. Co., of St. Louis, Mo., announces the appointment of George Richards & Co., 557 West Monroe Street, Chicago, Ill., under the management of J. P. Hopkins, as its representatives covering Illinois and Southern Wisconsin. The appointment of V. L. Warren, 1126 Plymouth Bldg., Minneapolis, Minn., is also announced as Twin Cities' representative covering Northern Wisconsin, all of Minnesota, North and South Dakota.

Manufacturers' Bulletins . . .

Lighting Equipment: Industrial and commercial reflectors, floodlights, spotlights, vapor-lighting units, and accessories are covered in a 64-page catalog No. 36. Bright Light Reflector Co., Inc., Brooklyn, N. Y.

Solderless Connectors: An 8-page illustrated bulletin "5 Important Points on the Burndy Servit," devoted to the construction, uses, variations, features and economies claimed for this line of outdoor and indoor solderless connectors. Burndy Engineering Co., Inc., New York, N. Y.

Mica Undercutter: A 4-page bulletin describes the Ideal Universal Undercutter, an electrically driven commutator undercutting tool for use in close quarters. Ideal Commutator Dresser Co., Syracuse, Ill.

Electrical Cord Sets: Bulletin No. 6082 lists heater cord sets, extension and replacement cords, Belden replacement heater cords, and three new heater appliance plugs. Belden Mfg. Co., Chicago, Ill.

Insulating Materials: First edition of "Guide Book," a 12-page house bulletin containing short general-interest items, also price lists and descriptive matter regarding insulating fabrics, papers, tapes and varnish. Mitchell-Rand Insulation Co., Inc., New York City.

Carbon Brushes: A looseleaf pocket-size catalog containing data on carbon brushes, classified as to brushes required for various makes of motors and also under the heading of uses, such as electric fans, portable tools, vacuum cleaners, etc. The Ohio Carbon Co., Lakewood, O.

Electric Unit Heater: Data Book No. 236, twenty-four pages, describes Electromode fan type all-electric industrial, portable and "Bilt-in-Wall" unit heaters. Detailed information on comparative heating costs, and how to determine the proper size unit by the "Watts per cu. foot" or "35" methods. Electric Air Heater Co., Div., American Foundry Equipment Co., Mishawaka, Ind.

Incandescent Lamps: A 28-page catalog devoted to the description of standard inside frosted lamps; large wattage types; vibration service; street lighting; spotlight and floodlight; street railway; train and locomotive; sign and decorative; flame shaped and round bulb; daylight; country home (28/32 volt); 3-light lamps; tubular and lumiline lamps. A glossary of common lamp terms, and tables of recommended intensities of illumination are also included. Hygrade Sylvania Corp., Salem, Mass.

Sound Equipment Magazine: The first issue of "Pick-Ups," a magazine devoted to the news of developments in the field of sound has been issued by the Western Electric Co. It deals with equipment designed by Bell Telephone Laboratories, manufactured by Western Electric Co., and distributed by the Graybar Electric Co. The initial number contains twenty-six pages with illustrations, in which are featured a new 5,000-watt broadcasting station at Minneapolis, Minn., new radiophone equipment for aviators, a two-way ultra-high frequency police radio installation at Evansville, Ind., and other subjects, including new sound equipment items. This publication will be issued several times a year.

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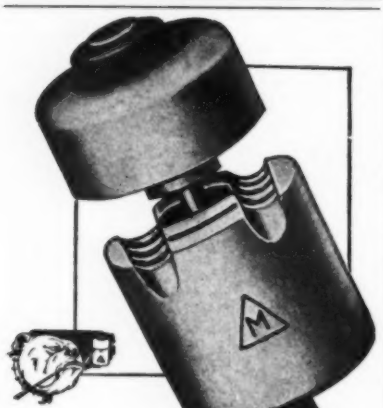

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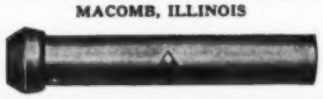

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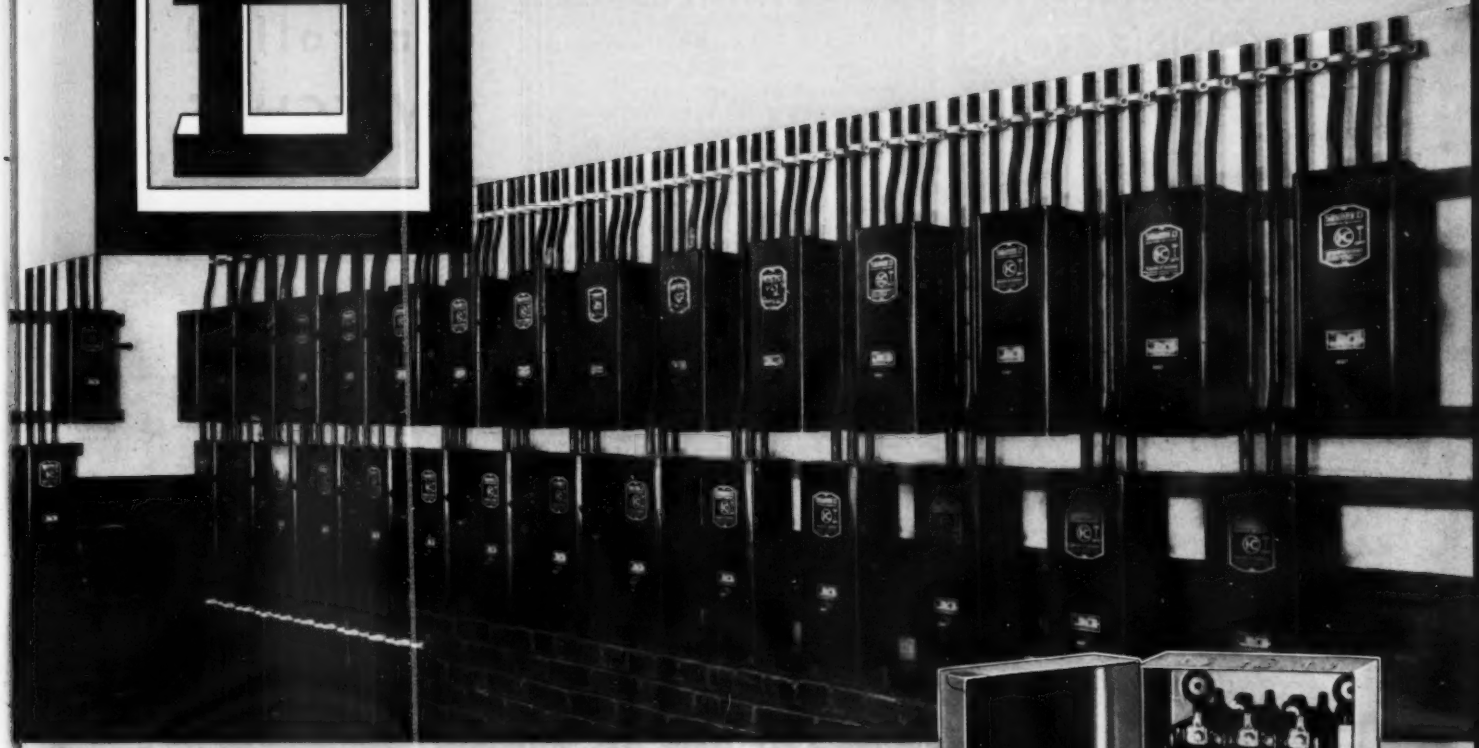

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